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Neighborhood Social Conduits and Resident Social Cohesion

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Neighborhood Social Conduits and Resident Social Cohesion

Abstract

Given the importance of the neighborhood context for residents' social cohesion, the current study examines the association between types of social and non-social places on three indicators of social cohesion: neighbor networks, social cohesion and neighborhood attachment. We spatially integrate data from the census, topographic databases and a 2012 survey of 4,132 residents from 148 neighborhoods in Brisbane, Australia and employ multi-level models to assess whether the variation in resident reports of social cohesion is attributable to land uses that function as neighborhood social conduits. We also consider the degree to which neighborhood fragmentation affects our indicators of social cohesion. Our findings reveal that even after controlling for the socio-demographic context of the neighborhood and a range of individual and household control variables, residents' reports of social cohesion are significantly associated with the types of social conduits, the diversity of land use and the degree of neighborhood fragmentation.

Neighborhood Social Conduits and Resident Social Cohesion

Introduction

The local neighborhood plays an integral role in social life as it is a central context through which social networks are both formed and maintained. Indeed, many of our social ties are developed and nurtured in our local neighborhood (Bridge, 2002; Henning and Lieberg, 1996). These social ties are important in fostering social cohesion (Browning et al., 2017; Hipp and Perrin, 2006), which in turn positively influences mental health and wellbeing (Barton and Pretty, 2010). When residents feel connected to each other, they work together to resolve local problems, leading to lower rates of crime, disorder and adolescent anti-social behavior are lower (Sampson, Raudenbush and Earls, 1997).

Given the importance of the neighborhood context for individual and neighborhood outcomes, numerous studies have examined the characteristics of neighborhoods that enhance social cohesion. For the most part, research has focused on socio-demographic characteristics, like ethnic diversity (Guest, Kubrin and Cover 2008; Putnam, 2007; Wickes et al., 2013), economic disadvantage (Bailey, Kearns and Livingstone, 2012; Mohan and Twigg, 2007), residential instability (Brown, Perkins and Brown, 2003) and their independent or combined effects on cohesion. Increasingly, scholarship finds neighborhood land uses may also be linked to social cohesion.

It is long recognized that particular places within neighborhoods are central to social life (Jacobs, 1961). With the recent availability of land use and census data at a fine spatial granularity scholars have begun to unpack how particular land use types provide the necessary pre-conditions for social interaction among local residents. Land use patterns, and the presence of certain features (such as parks or ‘high streets’) allied with neighborhood walkability positively influence residents’ perceptions of social cohesion by increasing

opportunities for local social interaction (Henriksen and Tjora, 2014; Pendola and Gen, 2008). Conversely land use features that impede localized mobility and face-to-face encounters with neighbors, such as rivers, freeways or industrial areas, reduce perceptions of social cohesion (Grannis, 2009; Hipp et al., 2014). Scholars also argue that the diversity and co-location of residential and commercial land use encourages routine encounters that build social connections (Achimore, 1993; Jacobs, 1961; Talen, 1999).

Although localized social interactions and social cohesion may be a function of neighborhood land use, an important limitation of this literature is the tendency for studies to consider the relationship between an individual land use type and social cohesion, without accounting for the co-presence of other land use features. What remains unclear is whether land uses differentially influence social cohesion when the physical characteristics of the neighborhood are considered in combination. We argue that not all land use features that facilitate co-presence will influence social cohesion. Civic centers, schools or religious institutions may have the specific goal of building community networks and enhancing cohesion, while other locales only provide opportunities for unscheduled, chance encounters among locals and non-locals or might even be harmful to social cohesion as they attract large numbers of outsiders with the effect of reducing opportunities for interactions between local residents. Only some land uses function as *neighborhood social conduits* (e.g. places that provide opportunities for social interaction) and these will also vary in importance for the development of social cohesion.

Using spatially integrated data from the census, topographic databases and a 2012 survey of 4,132 residents from 148 neighborhoods in Brisbane, Australia, we progress several aims in this paper. First we build on the work of Corcoran and colleagues (2017) and propose a theoretically informed typology of neighborhood social conduits that considers the frequency, intimacy and temporal routine of interaction among local residents. We develop

four distinct conduit types: anchoring; local exposure; scheduled; and extra local exposure conduits. Second we use this typology to examine the association between these neighborhood social conduits and three key dimensions of social cohesion: (1) neighbor networks; (2) neighborhood cohesion; and, (3) neighborhood attachment. Third, we consider if other land use features, such as the 'physical fragmentation' of a neighborhood ; the presence of social holes (Corcoran et al., 2017; Hipp et al., 2014) and 'undeveloped spaces' in combination with the socio-demographic characteristics of the neighborhood explain variations in social cohesion. Fourth, we assess whether it is the concentration of social conduits or the diversity of land use (Jacobs, 1961) that matter most for social cohesion.

Background literature

The sociology of physical places and spaces

Urban neighborhoods provide more than just residences and amenities and are better understood as 'scenescapes' that can encourage meaningful contact, social interaction and cultural exchange (Silver, Clark and Navarro, 2010). The neighborhood, therefore, represents a mosaic of land uses that directly impact the way in which people move through space and meet others by chance. Where some land use features encourage greater mobility through the local area, others promote lingering in public spaces, and thus generate the necessary pre-conditions for neighbors to interact as part of their regular daily routines (Arundel and Ronald, 2015; Oldenburg, 1989; Shaftoe, 2008). Other attributes create situations of non-occupancy with the effect of detracting from meaningful social life (Hipp et al., 2014) or might provide opportunities for crime and unwanted behavior to flourish (Bernasco and Block, 2011; Browning and Jackson, 2013).

Giddens (1981, 1985) provides a useful lens through which to understand the inherent spatiality of social life and the influence that particular 'locales' might have on social cohesion. Giddens argues that society does not exist independently of human activity nor is it

a product of it. Instead structure is the "medium and outcome of the reproduction of practices" (Giddens, 1981: 5) and locales are maintained or eroded by both intended and unintended consequences of human behavior. Social experiences are therefore a by-product of the intermingling between presence and absence in everyday life and are 'zoned' whereby certain actions, interactions and expressions will be acceptable in one locale, but prohibited in another (Giddens, 1985).

This point is highly relevant to our argument. Neighborhoods represent a bricolage of locales that span the private and public realm. Some locales are akin to third places (Oldenburg, 1989) and might be particularly important for the development of social cohesion. Others might represent non-places (Augé, 1992) or those depicting a hyperreality, where interactions are more artificial, instrumental and potentially damaging for social cohesion (Baudrillard, 1998). As social locales are used in a "routine manner to constitute the meaningful content of interaction" (Giddens, 1985: 272), it stands to reason that different types of land uses will differentially influence social cohesion.

The work of Bourdieu lends further weight to this argument. For Bourdieu (1990), the spatio-temporal rhythms of neighborhood social life reflect events and activities that occur and reoccur at particular places on a predictable schedule. Bourdieu (1990) refers to these routinized types of behavior as social 'practices', which contain knowledge, activities, objects and intentions. Physical spaces constitute the settings in which practices unfold and particular place characteristics help to shape the actions of groups and individuals. Thus the arrangement of physical spaces can manipulate social interactions by generating potential for face-to-face encounters, communication and social activities (Howley, O'Neill and Atkinson, 2015; Roberts, 2015; Zhu, 2015).

Urban design, place and social cohesion

Interest in the connection between place and social cohesion is also a central feature in new urbanism scholarship. New urbanism scholars consider urban sprawl and the suburbanization of urban neighborhoods as physically fracturing communities and encouraging social segregation (Freeman, 2001; Williamson, 2002). Others focus on master planned, compact city designs and argue that their placeless features erode the public realm and community life (Aelbrecht, 2016). Two recurrent themes in this body of work include a) particular types of land uses facilitate social interactions and connections better than others; and b) mixed use neighborhoods with access to a range of amenities such as parks, schools and local shops generate a strong sense of community (Arundel and Ronald, 2015; Jacobs, 1961, Lund, 2003).

Promoters of new urbanism argue that the built environment can create a sense of community. As Hillier and Hanson (1984: ix) argue "architecture pervades our everyday experience far more than a preoccupation with its visual properties would suggest". Although new urbanism, as a philosophy, is criticized for being overly spatially deterministic (Talen, 1998), architectural design and the physical features that comprise neighborhoods that in turn form the physical fabric of our cities are critical for creating the necessary pre-conditions for co-presence. And co-presence is the basis of all social interaction and the communication of behavioral norms.

Zhu (2015) suggests there are two pathways through which the built environment may facilitate resident participation: (1) by encouraging social involvement (the social capital pathway) or; (2) by cultivating place attachment and personal affection towards place (intra-psychic pathway). The former stresses the importance of communal space for social integration. In contrast, the intra-psychic pathway suggests that specific features of the urban form increase participation by facilitating place affection and attachment.

For many years the claims of new urbanism relating to the power of place to generate cohesion and connection were "plagued by a sheer lack of evidence" (Talen, 1998: 1362), yet recent scholarship indicates that the availability of local facilities (e.g., shopping, recreation and worship) within neighborhoods encourages resident interaction (Ahlbrandt, 1984; Lund, 2003) and over time, these social contacts can contribute to a sense of community. The density, design and diversity of land uses are also linked to an individual's network structure (Boessen et al., 2017). Francis and colleagues (2012) found that residents' sense of community was enhanced when they lived close to public spaces like neighborhood parks and schools, however, others contend that a sense of community may be more to do with the quality of the public space provided than the mere presence of these features (Zhang and Lawson, 2009).

Towards a typology of neighborhood social conduits

Building on the insights generated by the sociology and urban studies literature, we argue that neighborhood social conduits represent land uses that promote social interaction. Some social conduits promote scheduled activities attended by a defined group of members and thus support repeated and routinized interactions between individuals. Others are less bounded in both accessibility and functionality. In contrast to social conduits, non-places encourage action but not interaction and discourage lingering. Taking into consideration the ways social conduits differ in their function and capacity to support routinized interactions, we draw on the literature to qualitatively define four types of social conduits.

Anchoring conduits align with the concept of Oldenburg's (1989) third places and 'anchoring sites' (Aubert-Gamet and Cova, 1999) and represent land uses that promote relatively scheduled and routinized opportunities for co-presence, for example schools, libraries and health clubs. These may influence place attachment and perceptions of community because they are likely to form some part of the identity, even if they service a

greater catchment than the neighborhood in which they are located. These land uses support interactions between a regular group of users and encourage frequent interactions likely to lead to the development of social ties and perceptions of social cohesion and trust in neighbors.

Local exposure conduits are those that support encounters with other frequent users at sporadic and unscheduled points in time and may encourage acquaintanceship ties between regular users. This type of social conduit can be thought of as an 'exposure site' (Aubert-Gamet and Cova, 1999) as they offer individuals opportunities to engage with others in surroundings that are conducive to social exchange. They are familiar and stable, though the extent to which they generate a collective identity varies across neighborhoods[1]. Moreover, they are spaces that are open to a relatively diverse range of users, e.g. neighborhood parks.

Scheduled conduits facilitate scheduled activities for different users (e.g. train stations and cinemas) and may cater to people outside of the catchment area. While these conduits may provide opportunities for unplanned encounters with others, they represent places that have particular functions where activities are scheduled and routinized. Thus similar people may frequent these places regularly, and these places may also encourage acquaintanceship, but they are unlikely to generate a collective identity.

Our final conduit type, *extra local exposure conduits,* comprises land uses that provide opportunities for unscheduled, sporadic encounters between diverse users (e.g. shopping malls). This type of social conduit has large catchments and facilitates the co-presence of a great variety of users. They may have little or no impact on collective identities.

As with all attempts to group similar objects, we recognize these conduits may not be strictly exclusive in the form and function of social interaction they encourage. For example, while local health clubs are likely to promote social ties, some individuals may frequent the health club for purely instrumental reasons with little or no interest in the social benefits that

membership affords. Further, neighborhood churches and libraries are likely to attract non-local patrons, while remaining important sites for cohesion for residents in the focal neighborhood. While no land use type is *reducible* to only one function, our proposed conduit types are meaningfully distinguishable from each other, allowing for a nuanced examination of the built environment and its influence on the social life of local residents.

Methods

The Australian Community Capacity Study

We use survey data from the Australian Community Capacity Study (ACCS), a longitudinal study of urban communities in Australia. Australia is closely linked with the U.S., Canada, Germany, the United Kingdom and other OECD countries in its trade linkages, legal structures, technological advances and economic cycles (Otto, Voss and Willard, 2001). Wave 4 of the ACCS was conducted in 2012 in Brisbane, the state capital of Queensland and the third largest city in Australia with a population of 2.06 million at the 2011 census and a total area of 5,950km (Australian Bureau of Statistics (ABS), 2011). Brisbane comprises a total of 401 neighborhoods[2] ranging from high density inner-city neighborhoods to large, low density neighborhoods on the city fringe. Brisbane has a monocentric urban form through which a major river divides the northern and southern areas of the city. There is no ring road delineating the inner and outer neighborhoods. These neighborhoods are connected by ferries, buses and trains that operate on a radial network.

Brisbane is one of the fastest growing areas in Australia with an 11 percent population increase between 2006 and 2011. Growth in Brisbane is both a function of increasing density in areas closest to the city center and redevelopment of outlying areas. While up to 80 percent of some neighborhoods is made up of residential housing, land use accounts for only 10-20 percent of the total area in other neighborhoods. Brisbane is a relatively safe city and violence

is comparatively rare in areas located outside of key entertainment precincts (Queensland Police Service, 2015).

The ACCS Wave 4 sample comprises 4,132 randomly selected participants aged over 18 years residing in 148 randomly selected Brisbane neighborhoods. The consent and completion rate was 46.27 percent[3] (for further information see https://accs.project.uq.edu.au). The survey was conducted between May and August 2012 and lasted approximately 24 minutes. Participants were asked a series of questions about their local suburb, which is the unit of analysis for this study.

Administrative data

We spatially integrate survey data with the Digital Cadastral Database (DCDB) and Queensland Valuation and Sales data (QVAS) that depict land use classifications at the parcel level[4] (e.g. shops, parks and industrial areas), road network data and census data from the Australian Bureau of Statistics (ABS). Summary statistics are reported in Table 1.

<<Table 1 here>>

Dependent variables

Our three dependent variables are interval mean scales drawn from the ACCS survey and include residents' self-reported neighbor networks; perceptions of social cohesion and trust; and localized place attachment. Collectively they capture different dimensions of community cohesion (Forrest and Kearns, 2001; Jenson, 1998; Wilkinson, 2007).

Neighbor networks: This variable comprises a scale of 5 items (a full description of the items is found in Appendix A1). The scale yielded a Cronbach's alpha reliability statistic of 0.763, with 4.69 percent of the variation in individual neighboring between neighborhoods.

Social cohesion and trust: To capture respondents' perceptions of social cohesion and trust we computed a scale (alpha= .768) comprising four items from the ACCS (a full description

of the items is found in Appendix A1). The null model revealed 13.4 percent of the variation in social cohesion and trust is attributable to differences across neighborhoods.

Place attachment: Our measure of place attachment was computed using three items from the ACCS (a full description of the items is found in Appendix A1). The scale yielded a Cronbach's alpha reliability statistic of 0.801, 10.8 percent of the variation in social cohesion and trust attributable to neighborhood differences.

Neighborhood social conduits

Our four distinct neighborhood social conduits discussed previously are operationalized as follows:

Anchoring conduits (type 1) represent the percentage of total land parcels in the neighborhood that support repeated encounters with frequent users at scheduled points in time and include schools, public libraries, childcare centers, gyms/health clubs, community clubs and churches/religious facilities.

Local exposure conduits (type 2) represent the percentage of total land parcels in the neighborhood that support encounters with frequent users at sporadic and unscheduled points in time and include neighborhood parks, street front shops and pubs[5,6].

Scheduled conduits (type 3) represent the percentage of total land parcels in the neighborhood that facilitate scheduled activities with a range of different users, including local restaurants, cinemas, theatres, sports grounds and race tracks and train stations.

Extra local exposure conduits (type 4) present the percentage of total land parcels that provide opportunities for unscheduled, sporadic encounters between a range of different users. We include shopping malls in this category.

Social holes represent the percentage of total land parcels that may be publically accessible but do not contribute to the social fabric of the local neighborhood as they (a)

support anonymity; (b) lack the necessary landmark characteristics that encourage the development of place-based identity (Aubert-Gamet, 1999; Augé, 1992); (c) do not encourage lingering or support social interaction. We include vacant residential land, industrial spaces, carparks, caravan parks, cemeteries, defense force establishments, public hospitals, motels, large office buildings, prisons and service stations in this category.

State controlled national parks, forest and bushland: We separate state controlled national parks, forest and bushland from social conduits and social holes. These are land parcels that are located primarily in the outer regions of the city and comprise large areas of un-cleared vegetation and undeveloped bushland. Neighborhood parks with amenities are not included. We include the percentage of total land parcels that are forests and bushland in our models.

Land use diversity: To capture land use diversity we computed a Blau index using eight land use categories (Blau, 1977). Values of the Blau index range between 0 and .875 (given that we have eight categories), with lower values representing homogeneity and higher values indicating heterogeneity (Blau, 1977). Drawing on QVAS data, we categorize all parcels in Brisbane into one of eight land use categories based on primary land use. These include: residential; recreational; commercial or industrial; services; retail; educational; undeveloped greenspace and other (e.g. kerbs, roads, land reserved for sewerage pipes/water drainage or other utilities).

Neighborhood fragmentation

The arrangement of urban spaces can either facilitate or impede opportunities for encounters (Deffner and Hoerning, 2011; Grannis, 1998) and street patterns can divide and connect urban space, thereby influencing "where residents can go and what they observe and interact with along the way" (Southworth and Owens, 1993: 273). *Social wedges* include streets with speed limits above 60kph, railways and waterways. These features influence the propensity

for social interaction by fragmenting the neighborhood into a number of 'patches'. To capture the degree to which residential and social spaces within the neighborhood are fragmented by the presence of streets with speed limited above 60kph, railways and waterways we compute a *fragmentation index*. The fragmentation index measures the probability that two randomly selected points in the neighborhood will be located in a single patch. A greater number of social wedges in a neighborhood, reduces the chance that the two points will be in a single patch. Lower values indicate fewer wedges, while higher values indicate greater neighborhood fragmentation.

Neighborhood demographics

We included several neighborhood level variables from the 2011 ABS Census associated with neighboring, social ties and place attachment (Franzini et al., 2009; Lewicka, 2011; Markowitz et al., 2001). *Disadvantage* is a factor of three variables (factor loadings in parentheses): percentage of households within the neighborhood that earn less than $799 per week (0.879); percentage residents unemployed (0.907) and percentage of single parent households (0.953). The factor has an eigenvalue of 2.503. *Residential mobility* is measured as percentage households reporting a different address 5 years prior the census. To account for *ethnic diversity* we include a measure of language diversity. Language diversity is measured as a Blau index of the nine main language categories reported in the Australian census[7] (Blau, 1977). Finally we control for *population density*.

Individual demographics

We included several measures to capture individual demographic characteristics associated with neighboring, social ties and place attachment (Lewicka, 2011; McCulloch, Mohan and Smith, 2003; Putnam, 2007). We included measures of *age*, *gender* (0=male; 1=female), *marital status* (0= not married and 1= married) and presence of *dependent children* (0=no children; 1= children). We also included *length of residence* at the current address (1= less

than 6 months; 2 = 6 months to less than 12 months; 3 = 12 months to less than 2 years; 4 = 2 years to less than 5 years; 5 = 5 years to less than 10 years; 6 = 10 years to less than 20 years; 7 = 20 years or more); *employment status* (1=employed; 2= unemployed seeking work; 3= on a government pension; 4= other response) and whether the respondent spoke a *language other than English (LOTE)* at home (0=English only; 1= LOTE).

Analytic strategy

We employ a multi-level regression model using xtmixed command in STATA (version 13.0). The generalized form of a multilevel linear regression model can be expressed as:

$$Y_{ij} = \beta_{0j} + \beta_1 X_{ij} + \cdots + \beta_2 X_j + e_{ij}$$

$$\beta_{0j} = \beta_0 + \mu_{0j}$$

$$\mu_{0j} \sim N(0, \sigma^2_{u0})$$

$$e_{ij} \sim N(0, \sigma^2_e)$$

where subscript *ij* refers to the lowest level, and indicates a variable is measured at the level of the individual respondent, and the subscript j refers to the grouping level, and indicates that the variable is measured at the neighborhood level. The intercept term is denoted by β_{0j} where β_0 is the common intercept term and μ_{0j} is the random intercept for neighborhood. This multi-level regression accounts for variation in individual reports of functioning at the individual/household and neighborhood level. To address the research aims of the current study, we estimate multilevel models examining predictors of neighboring, social cohesion and trust and place attachment[8]. We estimate three models for each dependent variable: the first examines demographic predictors at the individual and neighborhood levels; the second includes our measures of the physical environment, these are the key independent variables; in the third models we include a measure of land use diversity. We only report on key neighborhoods variables in the tables herewith. Full models are detailed in

Appendix 2. The mixed models specify an unstructured covariance matrix and robust variance to account for the effect of clustering at the group level (within neighborhoods) on homoscedascity (West, Welch and Galecki, 2014). All models meet the assumptions for mixed models; qnorm tests demonstrate normality of residual distributions. We report standardized coefficients in text to demonstrate the magnitude of the effects of our key variables of interest on each of the three outcomes. Betas were computed using the following equation:$\beta_i = \frac{b_i * \sigma_{x_i}}{\sigma_y}$. Tables 2 through 4 report unstandardized coefficients and standard errors.

Results

Models 1 through 3 in Table 2 estimate the outcome of individuals' self-reported neighboring behavior. Model 1 includes individual and neighborhood level demographic characteristics. The findings demonstrate lower levels of neighboring in ethnically diverse neighborhoods. At the individual level, females, individuals with dependent children, home owners and long term residents report higher levels of neighboring than males, people without children, renters and more recent residents. Compared to individuals with a post-school qualification, those who report high school level education engage in less neighboring. In Model 2 (Table 2) we add our key variables of interest; social conduits, social holes and fragmentation. Residents in neighborhoods with more anchoring conduits (type 1) (β= 0. 19, $p<0.01$) and local exposure conduits (type 2) (β= 0.24, $p<0.001$) engaged in higher levels of neighboring than residents in neighborhoods with fewer of these facilities. Individuals living in neighborhoods less fragmented by streets with speeds over 60kph, waterways and train lines also report neighboring more with fellow residents (β= -0.21, $p<0.05$). All other significant associations reflected those demonstrated in Model 1 (see Table 2). In Model 3 we add a measure of land

use diversity and find a significant, positive effect of land use diversity on levels of neighboring (β= 0. 23, $p<0.01$).

Models 4 through 6 in Table 3 report the results of the analyses predicting neighborhood social cohesion and trust. Model 4 estimates the influence of demographic characteristics on perceptions of social cohesion and trust; results reveal that residents in disadvantaged and ethnically diverse neighborhoods have lower perceptions of social cohesion and trust than those in more affluent, homogenous neighborhoods. Alternately, females and home owners report higher perceptions of social cohesion and trust than males and renters. Model 5 in Table 3 demonstrates a positive association between the number of anchoring social conduits (β=0.13, $p<0.01$) in the neighborhood and perceptions of social cohesion and trust while residential fragmentation (β= -0.12, $p<0.05$) predicts lower social cohesion and trust. The effect of demographic characteristics reflects those reported in Model 4. In Model 6 we add a measure of land use diversity; greater land use diversity is associated with higher social cohesion and trust (β= 0.18, $p<0.01$).

Models 7 through 9 in Table 4 estimate the influence of demographic and physical neighborhood characteristics on place attachment. The demographic model of place attachment, Model 7 Table 5, demonstrates neighborhood disadvantage and ethnic diversity are negatively associated with place attachment. Older individuals, married individuals, residents with children and home owners report stronger neighborhood place attachment than younger residents, singles, residents without children and renters respectively. Model 8, Table 4 reveals that anchoring social conduits have a beneficial influence on place attachment (β= 0.23, $p<0.001$). Finally, Model 9 shows there is a significant positive effect of land use diversity (β= 0.25, $p<0.01$) on neighborhood place attachment. A significant relationship between residential fragmentation and place attachment also emerges; residents in neighborhoods that are more fragmented by roads with speed limits greater than 60kph,

waterways and train lines report lower place attachment than residents in less fragmented neighborhoods (β= -0.13, $p<0.01$).

These models reveal relatively consistent results across the three outcomes: neighboring; social cohesion and trust and place attachment. Anchoring social conduits benefit all three social processes as do neighborhood land use diversity. Alternately, residential fragmentation impedes neighboring, social cohesion and trust and the development of place attachment. Two relationships differentiate neighboring, a measure of behavior, from social cohesion and trust and place attachment, both measures of perceptions. Residents in neighborhoods with more local exposure conduits report higher engagement with neighbors whereas there is no significant effect of local exposure conduits on social cohesion and trust or place attachment. This finding suggests local exposure conduits may provide a stage for neighboring behavior to occur. Additionally, while neighborhood disadvantage is detrimental for perceptions of social cohesion and trust and place attachment, there is no significant association between neighborhood disadvantage and neighboring.

<<Table 2 here>>

<<Table 3 here>>

<<Table 4 here>>

Discussion

For decades scholars in sociology and urban studies have stressed the importance of neighborhood places for the development of local ties, a sense of community and attachment to the neighborhood. Yet it is only with the recent availability of unit level data that we have begun to consider how different types of places might affect local residents' social cohesion. Using spatially integrated data from the census, topographic databases and a 2012 survey of 4,132 residents from 148 neighborhoods, we addressed four aims. The first aim of our study was to classify social conduits and examine whether and how the presence of four different

types of social conduits explain variations in resident reports of neighbor networks, social cohesion and neighborhood attachment. Our second aim was to explore the relationship between other physical features of the neighborhood and social cohesion. Specifically, we considered how social holes and undeveloped spaces influence our three dimensions of social cohesion. Our third aim was to assess whether or not the degree of fragmentation in the neighborhood had an independent effect on social cohesion after accounting for the presence of social conduits and other types of spaces and places. Finally, we considered if diversity of land uses had an independent effect on our measures of social cohesion.

We find that different types of social conduits have differential consequences for our indicators of social cohesion. The presence of anchoring conduits – those places that support routinized interactions between regular users, encourage frequent interactions and contribute to the development of a shared identity – was linked to increased frequency in neighbor networking, higher reports of social cohesion and greater place attachment. Local exposure conduits, or those places that encourage chance interactions among local residents were also important, but only for increasing neighboring networks. They did not significantly enhance residents' social cohesion or attachment to the neighborhood. Thus their primary role appears to facilitate interaction, which may in time, lead to increases in other indicators of social cohesion. In contrast, scheduled and extra local exposure conduits did not lead to increased social cohesion. Although these types of places facilitate opportunities for frequent and regular co-presence of diverse patrons, for the most part they do not engender a collective identity. Thus social conduits that might be pleasant to frequent from time to time and afford some form of symbolic value for the community (e.g. a restaurant) or those that provide some instrumental or functional value (e.g. a train station) neither facilitate nor hinder the development of social cohesion. This finding resonates with Bourdieu (1990) who suggested that routinized social practices containing knowledge, activities, objects and intentions are

particularly important for shaping meaningful interactions. Moreover, as Giddens (1985) argued, social experiences are a by-product of the intermingling between presence and absence in everyday life. Places that generate interaction through co-presence, but do not offer opportunities to develop a shared identity that may extend beyond a given place or space, may be of little use for building cohesion among residents.

Our results also suggest that land use diversity positively influences all forms of social cohesion examined in this paper. Scholars have long argued that the co-location of residential and commercial land use encourages routine encounters that build social connections (Achimore, 1993; Jacobs, 1961; Talen, 1999). Our finding indicates that a concentration of particular types of conduits and the diversity of land uses together generate more positive perceptions of the neighborhood and increase the frequency of neighboring behaviors.

Our second key finding is that social holes and undeveloped land have no effect on any of our indicators of social cohesion. Although other studies suggest that empty lots and industrial areas may lead to feelings of fear and withdrawal from social life, our results show that when they are examined in the context of the neighborhood as a bricolage of spaces and places, they are benign for social cohesion. This highlights an important contribution to the literature – specifically, that these types of land uses, in and of themselves, may pose limited problems, if any, in neighborhoods that also contain land uses that encourage attachment and cohesion. Thinking about the ways in which land uses coexist across neighborhoods is an important area for further study.

The degree to which neighborhoods are fragmented by non-permeable features such as streets with speed limits greater than 60kph and waterways is consequential for neighborhood networks but did not significantly influence residents' reports of cohesion or attachment to the neighborhood. While fragmentation may limit opportunities for social

interaction, it does little to influence the perceived quality of the neighborhood or indeed perceived cohesion among residents. Although it could be difficult to establish ties with fellow residents in fragmented neighborhoods, the presence of particular conduits may engender attachment and cohesion.

Despite these advances, there are limitations that warrant comment. Our analyses are cross-sectional and thus do not capture changes in the physical structure of the neighborhood over time. Brisbane is one of the fastest growing areas in Australia with the census reporting an 11 percent increase in population over the period 2006 to 2011. Furthermore, the nature of this population growth has been spatially uneven. It is possible that examining the way in which spaces have shifted over time may reveal different or stronger effects of social conduits on social cohesion. As these data are not currently available, we suggest that future research focus on change as a critical force in explaining the association between social spaces, places and social cohesion. Moreover, a longitudinal approach would allow for an examination of the reciprocal relationship between the social demographics of the neighborhood, the social places located within the neighborhood and social cohesion. As places are shaped by residents and residents are shaped by places (Giddens, 1981), understanding these complex inter-relationships across types of places and different neighborhood contexts is a critical next step for research.

Importantly, our research does not examine the way in which residents move about in their neighborhoods. Until we are able to systematically capture the movement of individuals through space and time along with how this interaction influences individuals' perceptions, we must be cautious in our interpretation of the land use – social cohesion relationship. Through the development of ecological momentary assessment combined with land use and census data, future research will be better positioned to fine tune our classification of land

uses. Our research provides an important starting point and marks the beginning of a critical shift in research on land use and sociability.

In summary, this research provides evidence that particular types of places are important for social cohesion. The physical environment, even after controlling for the socio-demographic context of neighborhoods, influences neighbor networks, perceived social cohesion and affective attachment to place. Many current planning initiatives focus on creating co-presence through investment in high quality meeting places to promote social events which are fleeting and time limited rather than lasting community change. Our empirical findings would indicate that investments into places that anchor residents and encourage a shared, collective identity may do more for developing meaningful interactions and perceptions of social cohesion that are more enduring.

[1] These kinds of places may be important in generating a collective identity inner city neighborhoods, particularly when they have a concentration of third places such as cafes (Walters and Broom, 2013).

[2] In Australia, the term "suburb" is used to refer to a feature that in the U.S. would be referred to as a "neighborhood". The suburb classification is a governmental construct that has symbolic meaning to residents of the city (approximately 99 percent of the ACCS participants correctly identified the suburb where they live). We use the more familiar term "neighborhood" to refer to suburbs.

3. The the response rates for the ACCS are similar to or higher than other telephone based surveys conducted in Australia and U.S. (Lai, Zhao and Longmire, 2012; Larsen et al., 2004; Mummery, Duncan and Rift, 2007; Pickett et al., 2012).

[4] A land parcel is the smallest delineation of land in QVAS data defined "by measurement as a lot in a deposited plan or as a Crown portion or allotment" (QVAS, nd https://www.confirm.citec.com.au/qvas/qvas_glossary.html). They range in size and each is designated a primary land use. Some are also designated a secondary land use.

[5] Pubs represent the proportion of total land parcels that are bars, commercial hotels or venues holding a commercial liquor licenses. They do not include businesses operating under a subsidiary on-premises or subsidiary off-premises license such as restaurants, cafes, theatres or function centres as the sale of alcohol is not the principal activity of these businesses.

[6] In the literature local neighborhood bars are viewed as important sites for social interaction (Oldenburg, 1999) as well as potential sites for crime generation (Bernasco and Block, 2011; Groff and Lockwood, 2014). Our bivariate analyses of neighborhood pubs with our dependent variables reveal the former relationship, supporting Oldenburg's (1999) claim that local pubs promote social interaction among regular patrons.

[7] The Blau index is constructed using regional language categories from the ABS census: Northern European Languages; Southern European Languages; Eastern European Languages; South West Central Asian Languages; Southern Asian Languages; South East Asian Languages; Eastern Asian Languages; Australian Indigenous Languages; Other Languages; Speaks English Only.

[8] As the density of social conduits in disadvantaged neighborhoods may have a different relationship to social cohesion when compared to those in more affluent areas, we also tested for interaction effects. We did not find a moderating influence of neighborhood disadvantage on the association between any of our social conduit types and any of the three indicators of social cohesion. We also estimated models with spatial lags on the four conduit types; there

was no evidence of a significant influence of conduits in nearby neighborhoods on neighboring, social cohesion and trust or place attachment.

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Table 1 Summary statistics

	Min	Max	Mean (SD) or %
Individual Characteristics (N=4132)			
Neighboring	1	4	2.761 (0.687)
Social cohesion and trust	1	5	3.690 (0.664)
Place attachment	1	5	4.044 (0.723)
Age	18	87	53.39 (15.00)
Gender: Male	0	1	40.22
Marital status: Not Married	0	1	33.30
Dependent children: No	0	1	64.54
Employment: Employed	1	5	57.19
Unemployed seeking work			3.54
Retired (self-supporting)			16.03
On a pension			12.85
Other (e.g. home duties)			10.38
LOTE at home: English only	0	1	93.78
Home ownership: No	0	1	12.12
Time at Address: less than 6mths	1	7	0.68
6-12 mths			1.09
12mths-2yrs			2.86
2yrs-5yrs			12.45
5yrs-10yrs			23.41
10yrs-20yrs			32.42
20yrs plus			27.09
Neighborhood Characteristics (N=148)			
Conduit 1: *Anchoring*	0	3.369	0.398 (0.464)
Conduit 2: *Local exposure*	0	4.085	0.834 (0.583)
Conduit 3: *Scheduled*	0	0.474	0.035 (0.068)
Conduit 4: *Extra local exposure*	0	0.316	0.025 (0.046)
Land use diversity	0.327	0.738	0.594 (0.080)
Neighborhood fragmentation	0	0.908	0.558 (0.260)
Social holes	0.502	39.239	9.964 (6.800)
State forest and vacant rural land	0	5.648	0.780 (0.849)
Residential mobility	14.860	74.086	38.187 (10.34)
Disadvantage	-1.792	2.798	-0.042 (1.024)
Language diversity	0.063	0.716	0.281 (0.167)
Population density	0.100	34.754	10.138 (8.913)

Table 2. Multilevel regression: Predictors of neighboring (n=4132 N=148)

	Model 1 Demographics and neighboring			Model 2 Social conduits and neighboring			Model 3 Land use diversity and neighboring		
Neighborhood Characteristics									
Conduit 1: *Anchoring*				0.090	0.028	**	0.092	0.026	***
Conduit 2: *Local exposure*				0.095	0.029	***	0.075	0.029	*
Conduit 3: *Scheduled*				0.243	0.140		0.145	0.146	
Conduit 4: *Extra local exposure*				0.287	0.209		0.263	0.200	
Fragmentation Index				-0.166	0.073	*	-0.193	0.072	**
Social holes				0.002	0.003		-0.001	0.003	
State parks, forests, bushland				-0.011	0.029		-0.009	0.026	
Land use diversity							0.572	0.221	**
Disadvantage	0.003	0.018		0.005	0.018		0.005	0.017	
Language diversity	-0.464	0.093	***	-0.364	0.089	***	-0.373	0.089	***
Residential mobility	-0.0003	0.001		-0.001	0.001		-0.002	0.002	
Population density	0.0001	0.002		0.001	0.002		0.002	0.002	
Constant	2.366	0.095	***	2.303	0.099	***	2.057	0.133	***
N	4035			4035			4035		
Log likelihood	-4105.764			-4088.449			-4084.751		
Chi^2	164.255***			272.347***			297.655***		
ICC	3.32%			1.91%			1.67%		

Significance: *p< 0.05 ** p<0.01*** p<0.001 *Unstandardized coefficients*

Table 3. Multilevel regression: Predictors of social cohesion and trust (SCT) (n=4132 N=148)

	Model 4 Demographics and SCT			Model 5 Social conduits and SCT			Model 6 Land use diversity and SCT		
Neighborhood Characteristics									
Conduit 1: *Anchoring*				0.082	0.026	**	0.084	0.025	***
Conduit 2: *Local exposure*				0.036	0.024		0.015	0.025	
Conduit 3: *Scheduled*				0.361	0.216		0.255	0.229	
Conduit 4: *Extra local exposure*				0.281	0.256		0.255	0.252	
Fragmentation Index				-0.130	0.063	*	-0.158	0.061	*
Social holes				0.002	0.002		-0.001	0.003	
State parks, forests, bushland				-0.013	0.020		-0.011	0.016	
Land use diversity							0.0620	0.232	**
Disadvantage	-0.153	0.018	***	-0.149	0.017	***	-0.148	0.016	***
Language diversity	-0.265	0.091	**	-0.216	0.094	*	-0.228	0.092	*
Residential mobility	-0.002	0.001		-0.002	0.001		-0.003	0.002	*
Population density	-0.002	0.002		-0.002	0.003		-0.001	0.003	
Constant	3.620	0.099	***	3.605	0.107	***	3.337	0.154	***
N	4026			4026			4026		
Log likelihood	-3814.545			-3805.091			-3800.826		
Chi^2	281.559***			329.750***			368.629***		
ICC	3.70%			2.84%			2.50%		

Significance: * p< 0.05 ** p<0.01*** p<0.001 *Unstandardized coefficients*

Table 4. Multilevel regression: Predictors of place attachment (n=4132 N=148)

	Model 7 Demographics and place attachment			Model 8 Social conduits and place attachment			Model 9 Land use diversity and place attachment		
Neighborhood Characteristics									
Conduit 1: *Anchoring*				0.144	0.033	***	0.147	0.028	***
Conduit 2: *Local exposure*				0.024	0.029		-0.005	0.027	
Conduit 3: *Scheduled*				0.188	0.188		0.044	0.190	
Conduit 4: *Extra local exposure*				0.032	0.344		-0.003	0.335	
Fragmentation Index				-0.105	0.075		-0.144	0.070	*
Social holes				0.003	0.003		-0.002	0.003	
State parks, forests, bushland				-0.013	0.023		-0.010	0.020	
Land use diversity							0.840	0.276	**
Disadvantage	-0.149	0.019	***	-0.142	0.018	***	-0.141	0.017	***
Language diversity	-0.282	0.122	*	-0.228	0.119		-0.243	0.120	*
Residential mobility	-0.001	0.002		-0.001	0.002		-0.003	0.002	
Population density	-0.0003	0.002		-0.0003	0.003		0.001	0.003	
Constant	3.534	0.118	***	3.492	0.120	***	3.127	0.185	***
N	4034			4034			4034		
Log likelihood	-4261.632			-4250.253			-4243.834		
Chi^2	269.413***			368.905***			434.229***		
ICC	3.85%			2.82%			2.32%		

Significance: * p< 0.05 ** p<0.01*** p<0.001 *Unstandardized coefficients*