Social capital vs. anonymity? 3Ds Urban form and social capital development in Indonesian cities

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**ABSTRACT**

Discussions on the relationship between urban form and social capital have garnered attention for a long time as they are well documented in the literature. However, the empirical analysis regarding these two issues is still limited. This study proposes a new perspective on the link between the 3Ds (Density, Diversity, and Design) element of urban form and social capital in the global south using the Indonesian context. Using the linear multilevel regression, this study consistently revealed a contradicting result according to which greater residential density is negatively associated with several social capital factors. Surprisingly, more retail areas in cities are adversely associated with some social capital indicators. High connectivity did not necessarily encourage the development of social capital for small-medium cities. This study showed varied associations between density and social capital in small-medium, and large cities, with consistent results regarding land use mix.

**Research background**

According to the growing theoretical and empirical studies in the urban studies literature, the design of urban physical characteristics, often termed as urban form, can influence social capital development (Hanibuchi et al. 2012; Leyden and Goldberg 2015; Mouratidis 2017; Ali et al. 2019). However, the link between urban form and social capital development itself remains unclear. For instance, several studies showed that higher densities mean people live in spatial proximity to each other, and they are more likely to have spontaneous interaction (Bramley et al. 2009b; Jacobs 1961; Ali et al. 2019). Contrasting, other studies also found unfavourable results showing that high density negatively affects social interaction development and people are less likely to engage in social activities (Brueckner and Largey 2008; French et al. 2014). In terms of diversity, various public amenities in dense communities also serve as a third place, offering a physical space for people to gather and engage in community interaction (Cabras and Lau 2019; Cabras and Mount 2017). Meanwhile, Wood et al. (2010) showed that community sense was inversely related to the density of public amenities. Concerning design, high-density settings are also often supported by an integrated street network providing walkable neighbourhoods that facilitate a potential face–to–face interaction (Bramley et al. 2009b; Hemani et al. 2016; Leyden and Goldberg 2015). Nevertheless, another study also found that a high degree of connectivity tended to reduce the incentive to build more social capital (Hart and Parkhurst 2011; French et al. 2014; Muzaynahan et al. 2020).

These mixed results, coupled with existing studies that primarily focus on cities in developed countries, raise concerns about how urban form influences the social capital development of cities in developing countries. Thus, it is open for further discussion as different urban features might form different social capital (Yoo & Lee, 2016). Different study contexts
are essential as developing countries have distinct urban physical features and socio-demographic status from those in developed countries (Arifwiwido 2012; Karimi et al. 2017; Lu et al. 2017). Therefore, this study investigates the link between urban form and social capital formation in Indonesian cities. Indonesia is a valuable context for the study as it represents a relevant example of a global south country experiencing faster-growing cities. Indonesia is also expected to remain the fourth most populous country globally (World Bank 2016). Furthermore, according to Barliana et al. (2014) and Setiawan (2017), most Indonesian cities also suffer from various social disorder problems, such as lack of participation, individualism, and crimes. Additionally, almost 40% of urban dwellers in Indonesia consider the city where they live as unliveable (Heggie 2015).

Following Cervero and Kockelman (1997), the urban form component in this study consists of three main elements (density, diversity, and design) that are broadly used in the literature. Density is the most widely used concept as it is both a vital dimension and indicator of urban form (Bramley et al. 2009; Hemani et al. 2016; Mouratidis 2017; Seta et al. 2015). Meanwhile, diversity is commonly used to describe the built environment’s different functions (Dempsey et al. 2010; Hemani et al. 2016). Lastly, design is associated with street connectivity and the creation of a walkable environment. Regarding social capital, there is no single definition of this concept; thus, various social capital components are found in the literature. Following Szreter and Woolcock (2004), social capital is viewed as a group or network property. Therefore, the study distinguishes social capital from a network perspective that consists of bonding, bridging, and linking social capital. Álvarez and Romani (2017) argued that including these three forms of social capital is necessary to distinguish the degree of homogeneity in society and reflect the complexity of the social capital concept. According to Scrivens and Smith (2013), some authors also treated the concept of social capital synonymously with people participation. Hence, this study also added social participation as the fourth social capital indicator to indicate the degree of involvement and activities within society.

This study contributes to a better understanding of how urban form may affect the development of social capital in Indonesian cities in three ways. First, this study covers almost all Indonesian cities. Oidjarv (2018) and Bottini (2018) highlighted that previous studies used limited context investigation that only covers case studies of selected cities, making it hard to apply a general conclusion. Although this study’s results cannot be generalised outside the Indonesian context, the inclusion of a larger sample number enables the study to apply a general inference and validate the results in a broader Indonesian context. Second, this study contributes to fill the gap between urban form and social capital studies by analysing the role of urban form on social capital development in cities of different levels (small – medium and large cities). In his book, ‘Bowling Alone’, Putnam (2000) showed the appearance and prevalence of the notion that social capital is declining in high-density cities and tends to be more pronounced in small cities. Sørensen (2016) showed that bonding social capital appears significantly in rural settings, while bridging social capital is high in urban areas. Contrarily, Andersson et al. (2017) criticised this argument and stated that social capital exists in large cities, but it is expressed differently. Understanding the construction of social capital at different city levels is necessary as it has significant policy implications on how cities function, such as promoting knowledge diffusion or campaigning government policies (Andersson et al. 2017). Third, this study also classified public amenities into three basic categories (public, retail, and recreational essentials) to disentangle the contribution of each kind of public convenience to social capital development. Williams and Hipp (2019) argued that though sizeable research revealed the importance of public amenities to social capital formation, there is still a lack of attention in investigating which type of places underlie these social connections.

The remainder of this study is organised as follows. The first part deals with the introduction, and the second part describes the literature review regarding social capital and urban form nexus. The data is explained in the third section. Furthermore, the estimation strategy is discussed in section four. The empirical results and discussion are presented in section five. Lastly, the conclusion is in section six.

**Literature review**

**Urban form – social capital nexus**

Most previous literature mainly focused on socio-demographic or individual characteristics as the primary determinant of social capital development. For example, some researchers highlighted the importance of education as a key influential factor in preserving social capital.
as it contributes to shaping people’s behaviour and attitudes (Glaeser et al. 2002; Putnam 1995; Rupasingha et al. 2006). Instead, Yang et al. (2018) identified mixed findings regarding the link between income and social capital formation. The study by Glaeser et al. (2002) and Lee et al. (2017) showed that homeowners had a higher level of social capital because they had higher incentives for social capital investment and barriers to moving out. Considering these findings, the residential length of stay were also added as other fundamental factors for creating place attachment, promoting social capital development. Some authors revealed that the longer the residence period, the higher the social capital indicators (Ha 2010; Nguyen 2010; Ziersch et al. 2011). Contrastingly, some other studies noted contrary results where residential duration even appeared as non-significant variable (Kamruzzaman et al. 2014; Lee et al. 2017).

Furthermore, social diversity, such as ethnic and religious diversity, is also often argued as an important factor in social capital development. However, there is growing evidence that diverse communities have a detrimental effect on the community’s cohesiveness (Ezzy et al. 2020; Laurence et al. 2019; Van Der Meer and Tolsma 2014). Contrastingly, diversity can also be seen as an opportunity to establish social cohesion and design as a more inclusive policy (Ezzy et al., 2020). Furthermore, inequality was also added in the analysis of social capital, which is mainly recognised to have an inverse relationship with social capital (Parente 2019; Finneran and Kelly 2003; Coburn 2000). Besides these factors, the social capital formation also depends on several other demographic and social attributes, such as gender, marital status, age, size of the family, and the number of children (Arundel and Ronald 2011; Hoogerbrugge and Burger 2018; Oldjørvi 2018).

Nevertheless, Leyden and Goldberg (2015) argued that people’s willingness to engage in a community or feel socially connected with others is far more than only about individual characteristics or choices. It is also related to the physical environment where people live (Bottini 2018; Leyden and Goldberg 2015; Parts 2013; Wood et al. 2012). Social science scholars and urban designers corroborated this claim and supported that city designs can substantially affect social interaction formation (Washington APA 2015). Furthermore, Gehl (2011) argued that though the physical structure does not directly influence the quality and intensity of social contacts, it can affect the likelihood of seeing, gathering, and meeting people. Furthermore, Paranagamage et al. (2014) described that urban design can facilitate social capital formation by retaining people to stay longer in public areas and providing a place to form repetitive interactions.

Generally, the term urban form can be defined as a city’s physical characteristics (Azzam 2018; Dempsey et al. 2010). Oliveira (2016, p.2) described urban form as ‘the main physical arrangements that structure and shape the city’. According to Cervero and Kockelman (1997), the term urban form commonly comprises three main elements, often called 3Ds, namely, density, diversity, and design. Bramley et al. (2009) highlighted that density is a prevailing indicator of urban form widely received attention regarding its social impact. Meanwhile, other studies claim that the presence of amenities and essential services are crucial components in land uses (Bramley et al. 2009; Dempsey et al. 2010; Hemani et al. 2016). However, efforts to evaluate the role of public amenities on social capital development have concentrated on one type of amenities or mixed amenities without classifying them based their type (Arundel and Ronald 2017; Mouratidis 2017; Wood et al. 2012). Consequently, it is difficult to understand which type of amenities underlie social capital formation (Williams and Hipp 2019). Moreover, the density of street intersections per area is commonly used to measure street connectivity as an indicator of design (Kooohsari et al. 2014; Trova 2012).

Jacobs (1961) suggested that a high concentration of people, mixed-used, and the pedestrian-oriented neighbourhood known as the New Urbanism or compact city paradigm, are expected to promote social capital development. Numerous studies have corroborated Jacob’s view that dense area and spatial proximity are crucial for social capital development as they directly influence the cost of social capital investment (Burley 2017; Glaeser et al. 2002; Leyden 2003; Wood et al. 2008). Shorter distances enable lower the interaction costs and later increase the quantity of social interaction (Burley 2017). Furthermore, spatial proximity is important because it makes reciprocal relationships easy to start and maintains and enhances both the frequency and depth of social capital (Fazio and Lavecchia 2013; Glaeser et al. 2002; Patacchini et al. 2015). Meanwhile, the availability of various public amenities gathers people with different activities and purposes, ensuring shared facility use, which presents the opportunity to stimulate more significant social interaction (Wood et al. 2010; French et al. 2014). A high
degree of connectivity stimulates a more walkable environment facilitating potential, accidental, or casual social contact with immediate neighbours and other people (Hemani et al. 2016; Hanibuchi et al. 2012; Kamruzzaman et al. 2014; Leyden 2003).

However, several studies also showed opposite findings to Jacob’s theory. Glaeser and Gottlieb (2006) provided results across metropolitan areas in the U.S., showing that people living in dense areas appeared to be less involved in community projects, do less volunteering, and rarely go to club meetings. Contrastingly, Brueckner and Largey (2008) found that the frequency of interaction with neighbours and the number of confidants are lower in high-density areas. Moreover, Arundel and Ronald (2017) even found that density is insignificant on social capital and community sense for Amsterdam’s case. In the case of diversity, Wood et al. (2010) highlighted that an area with a high commercial mix was more likely to be associated with busy roads and congestion as it attracted strangers for shopping and business. Consequently, residents tended to detract from social interactions, particularly with their neighbours, which later negated creating a sense of the community. Regarding design, Hanibuchi et al. (2012) reported that older residents in the oldest neighbourhoods of Japan that are characterised by less street connectivity and pedestrian-friendliness tended to have higher levels of social capital than those in newly developed areas with grid-style street networks.

The aforementioned studies provide compelling evidence about the interaction between urban form and social capital development. However, pragmatically, the link is mixed and mainly focuses on developed countries. Applying the interaction between urban form and social capital in a different research area is essential as people form distinct social capitals according to their environment and interaction (Dave 2011; Putnam 2000; Yoo and Lee 2016).

**Social capital in cities**

Recently, the term social capital has been increasingly discussed and flourished as a research interest and policy consideration (Heijden and Lensberg 2003; Mpanje et al. 2018; Woolcock 2001). In urban economics, Helsley and Strange (2007) and Andersson et al. (2017) highlighted that interaction between individual agents was significantly fundamental to cities and played an important part in urban life. Furthermore, Glaeser et al. (2000) emphasised the importance of social interactions and networks in understanding the existence of cities and agglomerations. However, the concept of social capital remains elusive, hotly disputed, and poorly defined (Castiglione et al. 2008; Claridge 2004; Quibria 2003). Therefore, Claridge (2004) and Parts (2013) argued that the component of social capital should be seen as multidimensional and takes various complementary elements. The study followed Szreter and Woolcock (2004), who viewed social capital as a group or network property. The present study incorporated three primary forms of social capital: bonding, bridging (Putnam 1993), and linking social capital (Szreter and Woolcock 2004), which are operationalised as generalised trust, social tolerance, and institutional trust, respectively. Social participation was also added as the fourth indicator of social capital.

Among all indicators, trust is one of the most prominent elements in the discussion on social capital because it can enhance the willingness for social cooperation and be the social glue in society (Coleman 1988; Fukuyama 1995; Glaeser et al. 1999; Putnam 1993; Van Lange 2015). Uslaner (2002) defined generalised trust as a general trust in people, which does not depend upon life experiences, and argued that generalised trust is similar to bonding social capital. Additionally, Scrivens and Smith (2013) believed that generalised trust also encompasses trust in strangers. Hence, trust is essential to bind people together and substantial for many desirable institutional and societal goals (Aggarwal et al. 2013; Frederiksen 2019; Uslaner 2002). The study argued that generalised trust is relevant in cities as a city is a place full of strangers, and for anyone in cities, strangers are more common than acquaintances (Jacobs 1961). Andersson et al. (2017) corroborated this argument by proposing that social capital in large cities means that people do not need to be directly acquainted or actively maintain any form of social relations. Otherwise, they may connect by being neighbours, joining the same clubs, or working in the same building.

However, bridging social capital is a form of social capital that connects people across different groups within society, such as religion, race, and so forth (Claridge 2018). Therefore, following Park (2006), this study suggested that social tolerance also reflected bridging social capital as it involved the intention to accept individuals as different from one another in terms of who they are or what they believe. Similarly, Andersson et al. (2017) affirmed that people
in cities form a relation referred to as thin and indirect links that is similar to bridging social capital in Putnam’s terms. Furthermore, the study argued that social tolerance is crucial in facilitating interaction in cities because cities are generally associated with modernisation and heterogeneity (Wang et al. 2018; Zhang et al. 2015).

Linking social capital can be viewed as the extension of bridging social capital. Still, it differs because it focuses more on the vertical relationship between people or institutions at different levels of power hierarchy or public institutions (Claridge 2004; Szreter and Woolcock 2004). Trust in public institutions is essential as it can increase the opportunity to obtain broader public support and effectively implement the targeted policies (Myeong and Seo 2016). Following Woolcock (1998), the present study identified linking social capital as institutional trust. Lastly, social participation was included because it can help solve the problem of social exclusion and increase liveability in diverse and complex city life (Hoekstra and Dahlvik 2018).

**Case study context**

Indonesia is widely known as an archipelagic country with 17,000 islands spread sparsely from the Sabang Island in the west to Papua Island in the eastern region. Papua, Sumatra, Kalimantan, Java, and Sulawesi are the five biggest islands. Accordingly, this archipelagic formation has created around 300 different ethnicities, making Indonesia one of the most ethnically diverse countries in the world. Moreover, Indonesia is also acknowledged as a country with religious diversity and is home to 87% of the Muslim population, the largest Muslim population in the world (Chen 2010). While the Constitution assures the right to worship and gives freedom to choose and convert to any religion, the government only respects six major religions: Islam, Protestantism, Catholicism, Hinduism, Buddhism, and Confucianism (Masuda and Yudhistira 2020). In addition, these diversities are supported by national core philosophy named *Pancasila*¹ to generate ‘unity in diversity’ (*Bhineka Tunggal Ika*) (Pedersen 2016; Sakai and Isbah 2014). In many ways, this philosophy has successfully built a shared sense of national identity (Pedersen 2016). However, Indonesia sometimes also experiences some inter-group tensions and conflicts (Pedersen 2016; Sakai and Isbah 2014).

Furthermore, in terms of social capital, Indonesia also has a traditional concept of social capital that has been growing since its independence in 1945, known as *gotong royong* (mutual assistance). *Gotong royong* underlies the fundamental ideas of social interaction in the form of collective actions and mutual cooperation within society (Bowen 1986; Dokhi et al. 2017). However, rapid urbanisation and uneven economic development has led to modernisation and a reduction of personal bonds, causing an erosion in *gotong royong’s* value over time (Dokhi et al. 2017).

Currently, Indonesia is undergoing a structural transformation from a rural and agriculture-based sector to an urban and service-based industry (World Bank 2018). Moreover, according to Statistics Indonesia, in 2015, Indonesia’s urban population had reached 52.55%, more than half of the total population of the country. World Bank (2016) estimated that between the years 2000 and 2010, the number of urban areas in Indonesia increased at a rate of 1.1% per year, and has increased from 8,900 square kilometres to 10,000, most of which is compact. Furthermore, during the same period, urban population density increased significantly from 7,400 to 9,400 people per square kilometre, making Indonesia the largest in urban population density in the region (World Bank 2015).

However, unlike other countries, urbanisation in Indonesia is characterised by heavy concentration in a few large cities (Rustiadi et al. 2015). The spatial distribution in Indonesia is extremely uneven, with which almost 70% of the urban population is located in Java (World Bank 2018). Previously, in 1950, Jakarta was the only large city in Indonesia, but as of 2014, the number of cities included in this group has increased to 14. Furthermore, sizeable cities can also be found in Sumatra and Kalimantan islands, with fewer and smaller cities located in the eastern part of Indonesia (World Bank 2016). Despite rapid urbanisation, many cities in Indonesia also suffer from ‘diseconomies of scale’, such as severe traffic congestion, high level of pollution, and increasing crime, which potentially leads to high costs and social conflicts (World Bank 2016). Core infrastructural stocks in cities, such as road networks, water sanitation, electricity, and affordable housing, have not been balanced with the rapid urbanisation. Moreover, most spatial pattern development in Indonesia, particularly in metropolitan areas, is highly characterised by inconsistencies between spatial land use and plan (Rustiadi et al. 2015). Therefore,
Indonesia urgently needs immediate solutions to manage rapid urban growth better to achieve sustainable cities.

Data

Data source

This study employed data from three primary sources. The first is the 2014 National Socio-Economic Survey (Susenas), a large-scale survey by the Indonesian Central Bureau of Statistics covering representative samples nationally, which contains two main modules: core and supplementary modules. The household socio-demographic characteristics, such as age, sex, marital status, and so forth, are obtained from the core module. Meanwhile, the supplemental module provides additional household information that rotated over time, for example, household expenditure, socio-cultural aspects, health and nutrition, social resilience, and so forth. The social capital indicators were obtained from the Social Resilient Module which was administered for the first time in 2014.

Second, the data on the three main elements of urban form at the city level were obtained using ArcGIS 10.4 based on the Indonesia Geospatial Information Agency (BIG) database in 2013. Based on the Ministry of Home Affairs database, there are 514 districts and cities in Indonesia consisting of 416 districts and 98 cities. This study only focuses on urban area analysis; therefore, the study only included all respondents living in these 98 cities. The study also incorporated urban areas assigned as National Strategic areas, which will be developed as a metropolitan area, according to the National Development Planning Agency (Bappenas). Consequently, the study obtained 17,296 as the total number of observations nested in 102 cities. Using city identifiers, the study merged individual data with urban form data at the city level resulting in a hierarchical dataset consisting of level 1 (individual level) nested in level 2 (city-level).

Based on the Government Regulation number 26/2008 about National Spatial Layout, cities in Indonesia are classified according to population size and administrative definition. Small cities are urban areas with up to 100,000 inhabitants, medium cities have 100,000 to 500,000 inhabitants, and large cities have more than 500,000 inhabitants. Based on this definition, the samples in this study are categorised into two main subsamples: small-medium and large cities. Accordingly, the total sub-samples were 6,962 nested in 51 small-medium cities and 10,334 in 51 large cities.

As Indonesia is a diverse country, the study adds ethnic and religious diversity variables to control social heterogeneity aspects in cities using standard fractionalisation index (Alesina and Ferrara 2000; Miller et al. 2006; Nguyen 2010). However, it cannot obtain this information from the Susenas. Accordingly, it used the third data from 2014 (fifth wave) Indonesian Family Life Survey (IFLS). IFLS contained data that provided useful information to construct ethnic and religious diversity at the city level. IFLS is an ongoing longitudinal survey representing 83% of the Indonesian population in 13 out of 34 provinces of Indonesia.

Variables description

This study employed four indicators of social capital. The first indicator is generalised trust to measure the general level of trust in people, including strangers (Hanibuchi et al. 2012; Kim et al. 2011; Parts 2013). Generalised trust was obtained by combining five questions on a 4-point Likert scale (1 – do not trust to 4 highly trust). The answers were proxied using questions about whether or not respondents trust others or different people in society, such as neighbours, community leaders, religious leaders, and local authorities (Ha 2010; Nguyen 2010; Scrivens and Smith 2013). Following Hawley (2012) and Nguyen (2010), the generalised trust indicator was calculated as the mean of standardised respondent’s response items in the questionnaires.

The second indicator of social capital was social tolerance (Park 2006; Claridge 2018; Elgar et al. 2011). The study interpreted social tolerance as similar to the concept of bridging social capital (Andersson et al. 2017; Putnam 2000; Sørensen 2016). This indicator was proxied by questioning participants about seven items regarding their tolerance levels to other people from different religions and ethnicities. For example, respondents were asked whether they would agree or not if their children marry or make friends with people from a different religion or ethnic group. They were also asked whether or not they agree if people from other religions or ethnicities should organise an activity or build worship places in their neighbourhood. The answers were rated from 1 as
disagree to 4 as strongly agree. The index of social tolerance was created as the mean of the standardised variable.

Moreover, this study also employed institutional trust as the third indicator to represent linking social capital (Park 2006; Scrivens and Smith 2013). The questionnaire in the Social Resilience Module of 2014 included five questions probing the level of public trust in government institutions, such as trust in the elected president, representative council, police, local governor, and justice institution (Myeong and Seo 2016; Scrivens and Smith 2013; Ward et al. 2016). The index of institutional trust was computed as the standardised mean combined from these five questions’ answers.

Finally, social participation measured the degree of respondent’s involvement in society (Bottini 2018; Wood et al. 2010; Ziersch et al. 2011). Respondents were asked whether or not they participated in the following activities in the last year: neighbourhood meeting, neighbourhood collective action (such as *Kerja Bakti* social cooperation or *Siskamling/ neighbourhood security system*), faith-based activities, neighbourhood social activities (funeral, sickness, disaster), and community activities (sport competition, *Arisan*). Means of the standardised items were then computed as an index of social participation.

Following Cervero and Kockelman (1997), this study used three main dimensions of the urban form. Residential density was used as the indicator of density measured as the residential area ratio per total area in each city (Burton 2002; Christensen 2010; French et al. 2014; Lee and Lim 2017; Oidjarv 2018). This study followed Burton (2002), who argued that it was necessary to include density indicators of each city’s built-up area. Though net population density offers more considerable insight than gross density, it may not reflect the density at which people live. Therefore, Burton (2002) suggested measuring residential density by omitting the area of non-residential land from the density calculations.

Meanwhile, diversity of land use mix quantified the number of broad range amenities available within an area (Lu et al. 2017; Hanibuchi et al. 2012). This study distinguished three types of amenities: public essentials, retail essentials, and recreational essentials, argued as a common destination to meet and gather both intentionally or accidentally (Frenkel et al. 2013; Wood et al. 2012; Yoo and Lee 2016). Government offices, hospitals, and schools were included as public essentials. In contrast, retail requirements consisted of 17 destinations, such as convenience stores, supermarkets, stationery, pharmacy, mobile shop, laundry, automotive store, bank, bookshop, gift shop, bakery, clothing store, beauty shop, doctor, food store, home appliances store, and gardening store. Furthermore, 12 destinations were also identified as recreational essentials: cafes, museums, parks, cinema, hotels, libraries, zoo, worship places, camping sites, community centres, and restaurants. Street connectivity measures route networks to destinations connected directly or indirectly (Handy et al. 2002; Lu et al. 2017). Street connectivity is crucial as it is related to the degree of walkability, which is expected to induce the degree of sociability (du Toit et al. 2007; Leyden 2003). Street intersection density is commonly used as an indicator of this variable (Hanibuchi et al. 2012; Sharifi 2019; Handy et al. 2002).

Besides, at the city level, the study also incorporated ethnic and religious diversity to capture the social characteristics of the city, following Alesina and Ferrara (2000), Nguyen (2010), and Miller et al. (2006). Research suggested that more heterogeneous communities tend to have lower social capital (Alesina and Ferrara 2000; Ezzy et al. 2020; McKenna et al. 2018; Putnam 2000). Nevertheless, McKenna et al. (2018) underlined that the way ethnic and religious diversity affects social capital development cannot be generalised across different indicators of social capital. The heterogeneity of ethnicity and religion was measured using the fractionalisation index, which was calculated as one minus the Herfindahl index of group shares. Besides, city inequality measured by the Gini coefficient was also included to capture the degree of prosperity distribution (Finneran and Kelly 2003; Glaeser et al. 2009; Nguyen 2010). The literature highlighted that although the direct link between inequality and social capital is still unclear, an inverse one has often been found (Kawachi et al. 1997; Finneran and Kelly 2003; Parente 2019). A region with high inequality is more vulnerable to disintegration, making disadvantaged groups feel powerless and generating distrust (Alesina and Ferrara 2000; Uslaner 2002). Furthermore, seven variables of individual characteristics were added as the control variable to account for the possibility that these attributes also influence social capital development (Glaeser et al. 2002; Moulay et al. 2017; Rupasingha et al. 2006). These individual attributes included age, marital status, gender, homeownership, education level, income, and residency length.
**Estimation strategy**

This study employed a hierarchical regression approach as each observation at a lower level was nested at a higher level. Consequently, multiple individuals observed from the same groups tended to be more homogenous than those from different groups. Thus, the present study could not apply Ordinary Least Square (OLS) regression as the independence assumption of OLS was not held (De Leeuw and Meijer 2008; Leckie 2010; Liu 2016; Snijders and Bosker 1999). Heck and Thomas (2015) pointed out that multilevel modelling can overcome this issue because the different levels of regression equations can be incorporated into a single statistical model. The random intercept model was applied in the model, which treated all regression coefficients at the city level as fixed (Mühling 2012; Rabe-Hesketh and Skrondal 2005; Snijders and Bosker 1999). Four indicators of social capital were separately estimated with each key variable and control variables using Stata 14.1 software. The mathematical equation of the model specification is as follows:

**Level 1 (Individual level)**

\[
Soc\_Cap_{ij}^k = \beta_{0ij} + \beta_{1ij}\text{Age}_{ij} + \beta_{2ij}\text{Age}^2_{ij} + \beta_{3ij}\text{Gender}_{ij} + \beta_{4ij}\text{Marital}_{ij} + \beta_{5ij}\text{Homeowners}_{ij} + \beta_{6ij}\text{Income}_{ij} + \beta_{7ij}\text{Residency}_{ij} + \beta_{8ij}\text{Education}_{ij} + \beta_{9ij}\text{HHmember}_{ij} + r_{ij}
\]

**Level 2 (City Level)**

\[
\beta_{0ij} = \gamma_{00} + \gamma_{01}\text{Res\_dens}_{ij} + \gamma_{02}\text{Public}_{ij} + \gamma_{03}\text{Retail}_{ij} + \gamma_{04}\text{Recreation}_{ij} + \gamma_{05}\text{Street\_con}_{ij} + \gamma_{06}\text{Ineq}_{ij} + \gamma_{07}\text{ethnic}_{ij} + \gamma_{08}\text{Religion}_{ij} + u_{0j}
\]

where \(Soc\_Cap_{ij}^k\) is the indicator of social capital \(k\) of individual \(i\) in city \(j\). Given prior information, this study employed four indicators of social capital, \(i = 1, 2, \ldots, N_{ij}\) \((N_{ij} = 17,296)\) and \(j = 1, 2, 3, \ldots, J\) \((J = 102)\).

\(\gamma_{00}\) is the overall mean value of the social capital outcomes after controlling for urban form at the city level and \(\gamma_{01}\) to \(\gamma_{08}\) is the slope for urban form variables at the city level. Meanwhile, \(\beta_{1ij} - \beta_{9ij}\) is the slope parameter for control variables at the individual level.

However, only the main results of the model were discussed in this study. The null model was used to evaluate the extent to which the variance of the social capital variable can be explained at the city level or termed as Intra-Class Correlation/ICC (Raudenbush and Bryk 2002; Liu 2016; Arundel and Ronald 2017). Alternatively, the higher value of ICC also warranted the justification to employ multilevel modelling (Liu 2016).

**Results and discussion**

The descriptive analysis of the variables is provided in **Table 1**. The ICC value indicated that the city-level explained 6.13% of the total variance in **generalised trust**, 22.52% of the total variance in **social tolerance**, 15.34% of the total variance in **social participation**, and 7.69% of the total variance in **institutional trust**, respectively. These results indicated that variations in the social capital indicators were due to different characteristics between cities and guaranteed the use of a multilevel approach.

The estimation results using linear multilevel regression for all observations are shown in **Table 2**. In the first model, the study only included urban form variables. Meanwhile, model 2 further included all variables (individual attributes and urban form). Model 2 also simultaneously estimates the association between social capital indicators and different levels of variables. Based on the estimation results, residential density only appeared to have a negative and significant association with generalised and institutional trust. For instance, a 1-unit increase in residential density is associated with a decrease of −0.033 and −0.027 in generalised and institutional trust levels, respectively. That is, a one standard deviation increase in residential density is associated with a 3.04% and 2.5% decrease in generalised and institutional trust. Interestingly, this result contradicted the New Urbanism paradigm (Jacobs 1961; Leyden 2003).

Moreover, this outcome was consistent with a previous study showing that residents in the high-density area were less likely to build more trust (Muzaynah et al. 2020). Furthermore, the current finding showed that the higher the density, the lower the generalised and institutional trust levels. This result can be explained by the notion that cities with high-density settings are commonly associated with heterogeneity, and modernisation induced less face-to-face interaction for primary contact, later weakening social ties and reducing trust relationships (Wissink and Hazeldon 2012; Zhang et al. 2015). Similarly, Dempsey et al. (2012) also argued that individuals in the high-density area frequently run into strangers. Therefore, they tend to avoid unfamiliar neighbours, considering their place unfriendly.
Table 1. Descriptive statistics.

| Variables                        | N      | Mean   | SD    | Min | Max |
|----------------------------------|--------|--------|-------|-----|-----|
| **Dependent variable**           |        |        |       |     |     |
| Generalised Trust                | 17,296 | 14.060 | 2.029 | 5   | 24  |
| Social Tolerance                 | 17,296 | 16.108 | 2.875 | 7   | 28  |
| Social Participation             | 17,296 | 11.252 | 3.044 | 5   | 20  |
| Institution Trust                | 17,296 | 9.160  | 2.183 | 1   | 16  |
| **Urban form variable**          |        |        |       |     |     |
| Residential Density              | 17,296 | 0.381  | 0.924 | 0.001 | 7.513 |
| Public Essentials Density        | 17,296 | 0.277  | 0.818 | 0   | 8.156 |
| Retail Density                   | 17,296 | 0.723  | 1.534 | 0   | 10.815 |
| Recreation Density               | 17,296 | 0.813  | 1.824 | 0   | 12.430 |
| Street Connectivity              | 17,296 | 0.157  | 0.577 | 0   | 5.22 |
| **City variable**                |        |        |       |     |     |
| Inequality                       | 17,296 | 0.248  | 0.033 | 2.504 | 2.931 |
| Ethnic Diversity Index           | 17,296 | 0.947  | 0.152 | 0   | 0.999 |
| Religious Diversity Index        | 17,296 | 0.964  | 0.116 | 0   | 0.999 |
| **Socio – demographic variable** |        |        |       |     |     |
| Age                              | 17,296 | 47.540 | 13.436 | 15 | 98  |
| Length of Residency              | 17,296 | 26.950 | 18.870 | 0  | 98  |
| Homeownership                     | 17,296 |        |       |     |     |
| Owner                            | 12,590 (72.79%) | 0.727 | 0.445 | 0 | 1  |
| Renter                           | 4,706 (27.21%) |       |       |     |     |
| Number of HH Member              | 17,296 | 3.755  | 1.653 | 1   | 18  |
| Education Level                  | 17,296 | 3.026  | 1.286 | 1   | 4   |
| Not completed ES                 | 2,454 (14.83%) |        |       |     |     |
| Variables                        | N      | Mean   | SD    | Min | Max |
| Elementary School                | 4,079 (24.66%) | 0.455 | 0.208 | 0   | 1   |
| High school                      | 5,361 (32.41%) |       |       |     |     |
| Universities                     | 2,036 (12.31%) |       |       |     |     |
| Marital Status                   | 17,296 |       |       |     |     |
| Income                           | 17,296 | 14.902 | 0.759 | 12.231 | 18.758 |

The subsequent finding of this study regarding land use mix corroborated previous studies that urban amenities are vital in fostering social interactions between city dwellers. Indeed, a higher density of public essentials positively contributed to fostering the level of generalised and institutional trust. This result indicates that a one standard deviation increase in public essentials density is associated with a 2.12% and 1.71% increase in generalised and institutional trust, respectively. As public essentials defined in this study are related to the provision of public facilities or public infrastructures in nature; thus, a whole range of public infrastructures are crucial in facilitating the development of social capital (Klinenberg 2018). Latham and Layton (2019) also highlighted the importance of infrastructure as an integral part of urban life and plays a crucial role in how cities function. Better provision of public goods may facilitate a broader range of activities being available, which later contributes to encouraging trust both in people in general (generalised trust) and in public institutions (institutional trust) (Roskruge et al. 2012; Latham and Layton 2019). Conversely, a higher density of public essentials was inversely associated with social tolerance. The study argues that this result might be explained by the notion that as urban development in Indonesia is distributed unevenly and facing persistent gaps in infrastructures investment across cities (Ellis 2010; World Bank 2019), it contributes to social capital deterioration.

Furthermore, this study found an intriguing result regarding the presence of retail essentials. Surprisingly, the findings of this study showed that a higher retail and commercial mix density leads to a lower generalised and institutional trust level in cities, such that a one-unit increase in retail mix essentials is associated with a − 0.022 and −0.020 decrease in generalised and institutional trust, respectively. In addition, the city residents living in diverse retail mix areas were also tended to be less involved in community activities. In other words, a one standard deviation increase in retail mix density is associated with a decrease of 1.75% in social participation. This empirical finding validated the ‘Outsider or Stranger
Table 2. Multilevel regression result.

| Variables                          | Generalised Trust | Social Tolerance | Social Participation | Institutional Trust | Generalised Trust | Social Tolerance | Social Participation | Institutional Trust |
|-----------------------------------|-------------------|------------------|----------------------|---------------------|-------------------|------------------|----------------------|---------------------|
| **City level**                    |                   |                  |                      |                     |                   |                  |                      |                     |
| Residential density              | −0.030**          | −0.100           | −0.007               | −0.023***           | −0.033***         | −0.016           | −0.004               | −0.027***           |
| (0.014)                          | (0.012)           | (0.028)          | (0.011)              | (0.010)             | (0.010)           | (0.026)          | (0.011)              | (0.011)             |
| Public essentials density        | 0.029**           | −0.027***        | 0.027**              | 0.021***            | 0.026**           | −0.020**         | 0.016                | 0.021***            |
| (0.012)                          | (0.008)           | (0.013)          | (0.010)              | (0.012)             | (0.007)           | (0.012)          | (0.010)              | (0.010)             |
| Retail density                   | −0.023**          | 0.028***         | −0.034***            | −0.019***           | −0.022**          | 0.019**          | −0.025**             | −0.020**            |
| (0.009)                          | (0.007)           | (0.013)          | (0.009)              | (0.011)             | (0.006)           | (0.011)          | (0.009)              | (0.009)             |
| Recreational density             | 0.008*            | −0.002           | 0.019***             | 0.007***            | 0.009*            | −0.001           | 0.021***             | 0.008***            |
| (0.005)                          | (0.003)           | (0.006)          | (0.004)              | (0.005)             | (0.003)           | (0.005)          | (0.004)              | (0.004)             |
| Street connectivity              | 0.027             | 0.019            | 0.018                | 0.021               | 0.033*            | 0.032*           | 0.012                | 0.029               |
| (0.022)                          | (0.020)           | (0.042)          | (0.021)              | (0.019)             | (0.017)           | (0.039)          | (0.020)              |                     |
| Inequality                       | −0.291**          | −0.431**         | −0.023               | −0.343*             | (0.146)           | (0.202)          | (0.204)              | (0.184)             |
| Ethnic diversity index           | 0.015             | −0.024           | −0.299***            | 0.096               | (0.033)           | (0.081)          | (0.123)              | (0.067)             |
| Religion diversity index         | −0.028            | −0.009           | 0.327***             | −0.121*             | (0.036)           | (0.101)          | (0.126)              | (0.072)             |
| **Individual-level**             |                   |                  |                      |                     |                   |                  |                      |                     |
| Age                              | 0.309***          | −0.008           | 1.859***             | −0.212*             | (0.107)           | (0.073)          | (0.133)              | (0.116)             |
| **Age squared**                  | −0.038***         | 0.005            | −0.241***            | 0.031***            | (0.014)           | (0.009)          | (0.017)              | (0.015)             |
| Education (ref: not graduated from Elementary school) | −0.011**     | 0.004            | 0.012***             | −0.013***           | (0.005)           | (0.003)          | (0.004)              | (0.005)             |
| High school                      | −0.029***         | 0.022***         | 0.023***             | −0.037***           | (0.005)           | (0.003)          | (0.004)              | (0.005)             |
| Universities                     | −0.027***         | 0.027***         | 0.015***             | −0.040***           | (0.007)           | (0.003)          | (0.006)              | (0.006)             |
| Gender                           | −0.003            | −0.000           | 0.066***             | −0.010***           | (0.005)           | (0.003)          | (0.005)              | (0.004)             |
| Homeownership                    | 0.013**           | −0.009**         | 0.061***             | 0.001               | (0.005)           | (0.002)          | (0.005)              | (0.005)             |
| Length of residency              | 0.000***          | −0.001***        | 0.000***             | 0.000               | (0.000)           | (0.000)          | (0.000)              | (0.000)             |
| Marital status                   | 0.007             | −0.021***        | 0.083***             | 0.016               | (0.013)           | (0.006)          | (0.011)              | (0.010)             |
| Income                           | −0.001            | 0.034            | −0.041               | −0.002              | (0.002)           | (0.021)          | (0.028)              | (0.035)             |
| Number of household members      | −0.003**          | 0.000***         | 0.007***             | −0.000              | (0.001)           | (0.000)          | (0.001)              | (0.000)             |
| Constant                         | −0.010*           | −0.011           | −0.026***            | −0.029***           | (0.005)           | (0.007)          | (0.009)              | (0.007)             |
| (0.007)                          | (0.009)           | (0.007)          | (0.007)              | (0.211)             | (0.163)           | (0.291)          | (0.234)              |                     |
| ICC, null model                  | 0.061             | 0.225            | 0.153                | 0.076               |                   |                  |                      |                     |
| Number of observations           | 17,296            | 17,296           | 17,296               | 17,296              | 17,296            | 17,296           | 17,296               | 17,296              |
| Number of cities                 | 102               | 102              | 102                  | 102                 | 102               | 102              | 102                  | 102                 |

Standard errors in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01

Hypothesis' proposed by Wood et al. (2010), arguing that areas with a higher density of retail destinations provided many business and shopping alternatives. Consequently, it attracted many outsiders and commuters outside the area, resulting in a busy road with high traffic and congestion. Hence, residents reduced their street time and interacted less with immediate neighbours.

Contrarily, a higher density of the retail mix showed a positive association with a 0.019 increase in social tolerance. Although the availability of a diverse retail mix may attract outsiders or strangers, it also provides space for people to enjoy their leisure time, hang out, and share their interests with others (Ijla 2012). Consequently, more people gather together and the neighbourhood becomes friendlier.
and safer, broadening networks with friends and promoting social tolerance (Putnam 2000; Corcoran et al. 2018). Nevertheless, this study also confirmed the importance of recreational amenities in fostering social capital development. The result showed that recreational density appeared to have a positive and significant association with all social capital variables, except for social tolerance. In other words, each addition in recreational density is associated with 0.009, 0.021, and 0.008 increase in generalised trust, social participation, and institutional trust, respectively.

Some existing studies explained how land-use features might affect the development of these social ties. For example, Lund (2003) showed that recreational spaces serve as ‘third places’ to facilitate unplanned interactions, increasing a sense of familiarity, trust, and forming social cohesion. Oldenburg (2001) defined third places as public spaces and alternatives to social environments valued by individuals outside their private domains. Homes and workplaces are identified as first and second places (Oldenburg 2001; Cabras and Mount 2017). Therefore, third places, such as recreational amenities, work as incubators for broader interactions and formal and informal activities, which later enhance social cohesion (Ury and Larsen 2011; Yuen and Johnson 2017).

Meanwhile, urban street connectivity only appeared as a significant predictor for generalised trust and social tolerance variables. The results showed that higher street connectivity is positively associated with an increase of 0.033 and 0.032 in generalised trust and social tolerance, respectively. In either way, one standard deviation increase in street connectivity is associated with a 1.90% and 1.84% increase in generalised and social tolerance, respectively. This finding is consistent with some previous studies that found residents who lived in higher street connectivity shaping a high level of trust and social networks (French et al. 2014; Hemani et al. 2016; Lee et al. 2017).

Moreover, this study confirmed that the development of social capital is also significantly influenced by socio-demographic factors. As argued by Parts (2013), Putnam (2000), and Rupasingha et al. (2006), the study results affirmed that education is one of the key influential variables affecting social capital investment. Notably, as expected, homeowners possessed a higher level of generalised trust and social participation but a lower level of social tolerance than renters. This condition is probably because homeowners share a common concern and face the high transaction cost of moving out, and thus, lowering the mobility (Glaeser et al. 2002; Zhu 2015). Consequently, they have more incentive to build more trust and cooperate to improve the community (Glaeser et al. 2002; Rupasingha et al. 2006; Zhu 2015).

Regarding the length of residency, it also corroborated the result in the literature that residents who stay longer in their neighbourhood have a higher level of generalised trust and social participation than those with a shorter time in the neighbourhood (Ha 2010; Nguyen 2010; Ziersch et al. 2011; Wickes et al. 2019). Male respondents appeared to be more actively involved in social activities but had lower institutional trust than females. The age variable and its squared term were also significantly important as the social capital predictor. It supported the life cycle hypothesis in developing social capital for generalised trust and social participation indicators. Importantly, the results also confirmed that income inequality appears to have an inverse association with social cohesion (Kawachi et al. 1997; Finneran and Kelly 2003; Parente 2019).

Similar to previous studies examining the link between ethnic diversity and social cohesion, the results showed that ethnic diversity is inversely related to social participation. This finding supports the previous evidence that diverse societies might also result in lower trust and involvement in community activities (Putnam 2007; Mavridis 2015). Interestingly, religious diversity was positively associated with social participation but negatively related to institutional trust. This finding might be suitable to Indonesian characteristics as the country has been identified for its high tolerance (Fadillah 2017). Furthermore, as the government ensures that all religions and beliefs have an equal status in the Constitution, it may create a more tolerant attitude within the society (Maula 2013; Masuda and Yudhistira 2020).

**Urban form and social capital in small – medium and large cities**

The regression results for small – medium and large cities are presented in Table 3. The study regressed the model in the small-medium cities separately from large cities. It begins with small-medium cities’ analysis and continues with large cities afterwards.
Interestingly, mixed results appear for density and social capital indicators in small-medium cities. Meanwhile, residential density was positively associated with social participation and negatively related to institutional trust. This finding echoed with the findings of several studies that higher density brings people to live nearby, reducing travel costs, making reciprocal relationships easy to maintain, and facilitating voluntary participation (Glaeser et al. 2000; Leyden 2003). However, high density may also potentially initiate social problems, which later reduce social interaction and social trust (Mardiah 2015).

Furthermore, the results consistently showed that public and recreational essentials play an important role in developing social capital. In particular, a higher density of public essentials was associated with more institutional trust; meanwhile, increasing availability of recreational spaces led to higher social participation. The study argues that a possible explanation for recreational spaces leading to high social participation might be similar to a previously described section. Contrarily, high street connectivity in small-medium cities was negatively associated with social participation. In that case, high street connectivity does not necessarily increase walkability and reduce car dependency. Instead, a high degree of street connectivity makes people become more car-dependent. Hence, they spend less time allocating to social capital investment (Parkhurst 2011; Nabil et al. 2015). Furthermore, high street connectivity leads to higher institutional trust in small-medium cities.

In contrast to earlier findings in small-medium cities, the association of residential density and social participation in large cities interestingly had an opposite result. Specifically, residential density was negatively associated with social participation. Thus, it can be interpreted that residents in larger cities were less actively engaged and involved in community activities. This result supports previous findings that people living in larger and denser urban areas have lower trust in others, less confidence in public institutions, and are less active in their community’s social activities (Brueckner and Largy 2008; Nguyen 2010; Muzaynah et al. 2020). This result also corroborated Putnam’s (2000) finding that social capital development is more significant in smaller cities than those in larger cities. In the Indonesian context, a variety of socio-cultural characteristics in smaller cities encourage collective activities, such as mutual insurance (arisan), celebrations (baby birth and weddings), and collective work (kerja bakti) (Koenjtaraningrat 1985; Forshee 2006). Meanwhile, diverse socio-cultural backgrounds in large cities and modern urban life have made residents more socially aware and caused a change in lifestyle and social contacts (Zhang et al. 2015; Hype 2021).

Again, this study’s results amplified the importance of urban amenities (public and recreational) in fostering social capital development. In this sense, public and recreational amenities in large cities also facilitate social capital formation. Interestingly, a higher density of retail essentials in large cities resonated with the

Table 3. Subsample multilevel regression result.

| Variable       | Small – Medium Cities | Large Cities |
|----------------|-----------------------|--------------|
|                | Generalised Trust     | Social Tolerance | Social Participation | Institutional Trust | Generalised Trust | Social Tolerance | Social Participation | Institutional Trust |
| Residential density | −0.039 (0.033)       | −0.047 (0.070) | 0.139*** (0.047) | −0.081* (0.044) | −0.056 (0.052) | −0.023 (0.023) | −0.153*** (0.053) | −0.069 (0.066) |
| Public essentials density | 0.056 (0.036)       | −0.030 (0.057) | 0.029 (0.064) | 0.078*** (0.024) | 0.011 (0.047) | 0.032 (0.029) | 0.150*** (0.038) | 0.082*** (0.031) |
| Retail density | −0.049 (0.413)       | 0.039 (0.052) | −0.062 (0.063) | −0.074*** (0.028) | 0.027 (0.017) | 0.028*** (0.009) | −0.001 (0.013) | −0.033*** (0.012) |
| Recreational density | 0.016 (0.021)       | −0.020 (0.019) | 0.054** (0.025) | 0.025 (0.016) | −0.014 (0.009) | 0.000 (0.005) | −0.006 (0.009) | 0.013*** (0.006) |
| Street connectivity | 0.052 (0.047)       | 0.084 (0.101) | −0.186*** (0.067) | 0.011* (0.063) | 0.022 (0.096) | −0.034 (0.052) | 0.153 (0.108) | −0.001 (0.116) |
| Constant | −0.761*** (−0.761) | −0.237 (−0.237) | −3.388*** (−3.388) | 0.520 (0.520) | 0.132 (0.132) | 0.848** (0.848) | −1.993*** (−1.993) | −0.050 (0.050) |
| Control Variables | YES | YES | YES | YES | YES | YES | YES | YES |
| ICC (null model) | 0.054 | 0.244 | 0.175 | 0.096 | 0.054 | 0.191 | 0.117 | 0.054 |
| Number of observations | 6962 | 6962 | 6962 | 6962 | 10.334 | 10.334 | 10.334 | 10.334 |

Standard errors in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Control variables: age, age squared, education, gender, homeownership, length of residency, marital status, income and number of household members.
findings in the full sample model, which was positively associated with social tolerance and had an inverse relationship with institutional trust. Additionally, this result again corroborated the outsider or stranger hypothesis as we mentioned previously. Meanwhile, street connectivity was not a significant predictor for all social capital indicators in large cities.

Conclusions

Previous studies put increasing attention on the importance of the concept of social capital and its development. Despite the proliferating research on the interaction between social capital and the physical environment, this aspect is rarely supported by sufficient empirical evidence, particularly in emerging countries. In this sense, this study aimed to disentangle the link between the 3Ds element of urban form and social capital development in Indonesia. Moreover, it also covers all cities in Indonesia as a noteworthy contribution, leading to reliable results that can be generalised to a broader Indonesian context. Another contribution is that this study classified public amenities into three different types to better disentangle each amenity’s contribution to social capital development. It also presented estimation for other groups of cities to investigate any differences in urban form’s role in social capital development for small-medium and large cities.

Employing a linear multilevel model, the study showed an intriguing result that contradicts the New Urbanism principles. Instead, residential density appeared to be negatively associated with generalised and institutional trust in the full sample model. Furthermore, this study also found a contradictory result on the relationship between density and social capital in small-medium and large cities. In small-medium cities, density exhibited a positive association with social participation and institutional trust. Conversely, it has a positive association with social participation in large cities. These different findings corroborated Putnam’s phenomenal book ‘Bowling Alone’ (2000), showing that smaller cities exhibit stronger social capital than large cities. Moreover, early urban sociologists have also long acknowledged Putnam’s findings, which emphasised that traditional values and relationships in smaller towns promote closer social networks among residents (Park 1917). In contrast, larger cities with high-density settlement settings and busy urban life may erode primary contacts and undermine the traditional basis of community solidarity (Zhang et al. 2015).

The positive associations between the density of public essentials and several indicators of social capital, both in full and subsample estimations, further supported that the availability of a wide range of public infrastructure contributes to the maintenance of social connections and makes the social life of cities (Latham and Layton 2019). In addition, the presence of recreation essentials also significantly showed a positive association with several social capital indicators for all sample and subsample estimations. This finding supported the idea regarding the crucial role of ‘third places’ as a component of urban form for social capital development. In contrast, the presence of retail essentials brought a mixed effect on social capital development. Following some previous studies, higher street connectivity is positively associated with generalised trust and social tolerance in the full sample, but negatively associated with social participation in small-medium cities and insignificant in large cities.

Taken together, the findings suggested that urban form can also be considered as an essential element in the development of social capital in Indonesian cities. The opposite association between residential density and social capital variables suggested that urban policymakers need to manage density better, particularly in large cities with high-density settings. Density beyond a certain point may bring a contradicting effect, negating the quality of social ties formation. Meanwhile, for small and medium-sized cities, well-structured urban planning and maintaining a balance between density and the city dweller’s quality of life must also be considered. However, the study acknowledged that it could not provide this information in detail. Thus, further research is suggested to accommodate this issue.

The diversity of land use is also determined using a significant predictor of the social capital establishment. Public and recreation amenities are essential as places for people to gather and meet with friends, families, or acquaintances both in planned or unplanned ways. Given this result, this study suggests that urban planners should pay attention to the availability and quality of public amenities as a priority in planning policies in small, medium, and large cities. Nevertheless, the present study struggled to collect the dataset on high-quality public and recreational amenities. Besides, this study only obtained the data in an aggregated way without the information regarding the quality of these public amenities. Hence, it could not provide further analysis regarding the quality of these public spaces. This study also provides analysis
that is limited to the city–level because it could not obtain the urban form variable at a lower micro-level, i.e., household-level, as the data containing their postal address was inaccessible (publicly). Whereas, regarding the negative effect of mixed retails and business commercials, it could not disentangle further the precise reason behind this result. However, this study would still suggest that urban policymakers should design cities that are more pedestrian-friendly and walkable. This study was unable to provide causality analysis due to its cross-section nature. Thus, there is a need for panel data analysis to determine the causality between urban form and the development of social capital in the future.

**Note**

1. Pancasila consists of five moral principles: 1) belief in the one supreme God; 2) just and civilised humanity; 3) unity of Indonesia; 4) democracy led by the wisdom of deliberations among representatives; 5) social justice for all Indonesians.

**Acknowledgements**

The authors would like to sincerely thank the editor and two anonymous reviewers for their valuable comments to improve this paper. The authors would like to thank the Universitas Indonesia for funding this research through the PUTI Grant with the contract number NKB-1773/UN2.RST/HKP.05.00/2020.

**Disclosure statement**

No potential conflict of interest was reported by the author(s).

**Funding**

PUTI Grant with the contract number NKB-1773/UN2.RST/HKP.05.00/2020/award-id; Universitas Indonesia

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1 Appendix List of Social Capital questions

The question to measure generalised trust

(1) Do you trust your neighbours to take care of your children if no adult household members stay at home?
(2) Do you trust your neighbours to look after your house when all household members travel/stay elsewhere?
(3) In general, do you believe that a religious leader in your neighbourhood can be a good role model?
(4) In general, do you believe that community leaders in your neighbourhood can help to solve the community’s problems?
(5) In general, do you believe that the local apparatus in your neighbourhood has done its job well?

Questions to measure social tolerance

(1) Do you agree if your children are married to someone from a different religion?
(2) Do you agree if your children are married to someone from different ethnic groups?
(3) Do you agree if your children are making friends with people from different religions?
(4) Do you agree if your children are making friends with people from different ethnic groups?
(5) Do you agree if a group of people of different religions arranges religious activities in the neighbourhood?
(6) Do you agree if there is or there will be a built place of worship of other religions in the neighbourhood?
(7) Do you agree if a group of people of different ethnic groups carries out activities in the neighbourhood?

Questions to measure social participation

In the last year, do you participate in the following activities:

(1) Become an organisation member
(2) Community meeting
(3) Collective action (Kerja bakti and siskamling)
(4) Helping neighbours in a time of difficulties (funerals, visiting sick neighbours)
(5) Religious event
(6) Social community activities (arisan, sport)

Questions to measure institutional trust
(1) Do you believe that the elected president can lead the country into a prosperous nation?
(2) Do you believe that the parliament represents and express the people’s aspiration?
(3) Do you believe that the governor in your region can carry out regional development?
(4) Do you believe that the police can maintain public safety?
(5) Do you believe that the judiciary can be fair in resolving the case?

Source: Social Resilience Module, Susenas (2014)