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Fight, flight or friction? The effect of population density on general trust in China

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ABSTRACT

Population density affects human behavior. A dense population has been shown to exacerbate impulses such as, "*fight*" (aggression stimulated by crowding) or "*flight*" (withdrawal from social life for escape). This paper explores the impact of population density on the level of generalized trust that lies in China, a topic understated by extant empirical studies so far. Drawing data from Chinese General Social Survey (2010–2013), we attempt to examine the density-trust link. China provides a context-specific case because: (1) the narrow "radius" of generalized trust (people's notion of "most people" is more in-group connoted than out-group connoted) derived from Confucian tradition decreases the probability of interacting with out-group members, suggesting that both "*fight*" and "*flight*" that rely on out-group interactions have little effect in this context, and (2) *hukou* (household registration) restrictions force rural-to-urban migrants into the secondary labor market, leading to social segregation producing distrust in cities. The results of hierarchical models on data from 17,331 individuals and panel models on data from four waves of 114 counties both revealed that (1) population density negatively predicts the level of generalized trust among urban residents and (2) it is "*friction,*" or occupational segregation by *hukou* restrictions, that mediates the density-trust relation, neither "*fight*" nor "*flight*" does.

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Introduction

Existing studies have found that population density impacts people's behavior, but if and how it affects the generalized trust requires more detailed empirical evidence. Population density refers to the number of individuals per unit of space, referring specifically to outdoor spaces, such as urban land, rural land, community, or neighborhood (Choldin 1978). The social outcomes of population density in cities were first noted by early sociologists Simmel (1950) and Wirth (1938). Since then, it has been extensively analyzed and hotly debated by sociologists in 1970–1980s (see Choldin 1978 for a review). Many of those studies focused on a "density-pathology" hypothesis (Choldin 1978, 91), or the detrimental effects of density and crowding on human behavior. The findings have indicated that the negative effect of density on human behavior was explained by "*fight versus flight,*" two well-known responses to crises introduced by ethologists (McBride 1971; Regoeczi 2002). The premise is that resource competition led by high density or crowding gives rise to stimulated aggression or *fight* among individuals, or it provokes social withdrawal for protection or *flight* (see Regoeczi 2002 for a review).

Extending this density-pathology hypothesis to the broader sociological literature, we seek to apply the concept to the issue of trust. Generalized trust, or general/social trust, has long been at the center of sociological research (see Delhey and Newton 2003, 2005 for reviews). Drawing on the density-pathology hypothesis, we deduce that increased density can lower generalized trust by causing individuals to avoid social interactions with others. Likewise, real or perceived resource competition in high-density areas can decrease generalized trust by provoking aggressive behaviors, such as violence and crime. However, empirical evidence is needed to examine this potential linkage between trust and density.

To this end, we performed an analysis of the density-trust link using data collected from China. China provides an interesting case for two reasons. First, previous studies have shown that countries with Confucian culture are often associated with narrower trust radius compared to Western societies (Delhey, Newton, and Welze 2011; Fukuyama 1995). In Confucian societies, such as China, people's notion of "most people" is more in-group (family members, relatives, neighbors, or acquaintances, etc.) connoted than out-group (strangers, people of another religion, nationality, or social groups, etc.) connoted. This suggests that if density is found to affect trust, "*fight*" and "*flight,*" the responses to social interactions with out-group members, may not fully explain the density-trust linkage among the Chinese.

Second, in recent decades, China's demographic changes have been profoundly defined by rural-to-urban migration under the rigid *hukou*

household registration system, specifically, the agricultural and non-agricultural residency status assigned by authorities and highly restricted to transfer (from rural to urban status). Due to the *hukou* restrictions, most rural-to-urban migrants were forced into the secondary labor market and ended up on the lowest rungs of the social ladder in cities (Chan 2010; Li, Gu, and Zhang 2015; Meng and Zhang 2001; Zhang and Wu 2017). The presence of the unique *hukou*-based segregation strongly suggests that if density affects trust among the Chinese, "*friction*" caused by *hukou* restrictions might be at work, since social cleavage is one of the major origins of distrust (Delhey and Newton 2005).

In this study, therefore, we aimed to answer the following two questions in the context of China: (1) Can density-pathology hypothesis extend to generalized trust, and if yes, (2) through which mechanism, "*fight,*" "*flight,*" or "*friction.*" We present the first nationwide representative evidence regarding the relations between population density and generalized trust using data collected by Chinese General Social Survey from 17,331 respondents in 119 Chinese counties and 30 provinces between 2010 and 2013 as well as the matched county-level information extracted from various sources. We show that county population density indeed negatively predicts people's generalized trust, but the mechanism we uncover is neither "*fight*" measured by criminal and civil cases nor "*flight*" proxied by the level of socializing activities within the county. Instead, we reveal that occupational segregation resting on *hukou* restrictions, or "*friction,*" mediates the role of density in trust. In addition, the results obtained from both individual levels using hierarchical models and county levels using panel models are generally consistent, showing that our findings have both logistic and ecologic grounds.

The rest of the paper is organized as follows. We first review the existing studies on generalized trust and density-pathology theories, describe the urbanization in contemporary China, and then derive mechanisms beneath the link between population density and generalized trust. Next, we describe the data, variables, and analytical strategies applied to different levels of analyses. We then move on to empirical findings and discuss their implications for the wider trust and spatial sociological literature.

Trust and density

A large body of research on trust in others has been accumulated in the field of sociology (Coleman 1990; Fukuyama 1995; Helliwell and Putnam 2004; Inglehart 1997, 1999; Putnam 1995, 2000; Uslaner 2002; Delhey and Newton 2003, 2005). Generalized trust, in particular, has long been at the center of sociological research as well as various specialized academic fields (Braithwaite and Levi 1998; Coleman 1990; Gambetta 1988; Hollis

1998; Luhmann 1979; Misztal 1996; Seligman 1997; Sztompka 1996, 2000; Warren 1999). In this line of research, generalized trust has been generally thought to lay a foundation for social goodness, such as "reciprocity, social connectedness, peaceful collective action, inclusiveness, tolerance, gender equality, confidence in institutions, and democracy itself" (Delhey, Newton, and Welze 2011, 787; Helliwell and Putnam 2004; Inglehart 1999; Putnam 2000; Stolle and Hooghe 2004; Uslaner 2002). Numerous studies have addressed the determinants of generalized trust. Among them, two main strands of theories have been developed and examined thus far (Delhey and Newton 2003).

One theory stress that generalized trust is either a result of individual inner trusting trait determined by optimism and feelings of life control (Allport 1961; Cattell 1965; Erikson 1950; Rosenberg 1956, 1957; Uslaner 1999, 2000) or a product of adult life experience associated with individual attributes, including gender, age, income, education, happiness, and well-being (Newton 1999, 173; Orren 1997; Whiteley 1999). The other theory sees generalized trust as an indicator of the trustworthiness of the communities/societies associated with societal variables, such as social networks, characteristics of communities, and socioeconomic factors at the country level (Booth and Richard 2001; Fukuyama 1995; Inglehart 1999; Knack and Keefer 1997; Newton 2001; Paxton 2002; Putnam 2000; Yamagishi and Yamagishi 1994). Compared to individual determinants of generalized trust, however, less consensus has been reached on whether and how societal factors matter. As Delhey and Newton (2003, 97) described, "If generalized trust is based upon the social circumstances in which people find themselves, it should be statistically associated with societal variables. However, there is little agreement about what variables are important."

Although the belief that people living in sparsely populated areas tend to be more trusting may be a stereotype, it looks intuitive and explainable even without the need to consider common socioeconomic factors of trust. Consider cases such as nomads in remote Mongolia or Scottish Highlanders, for instance, the low odds of meeting someone else may explain their unique hospitality, a social code, and an honored tradition closely related to trust. Indeed, social outcomes of density or crowding had long been posited by early leading sociologists like Simmel (1950) and Wirth (1938) and hotly debated in 1970–1980s as an intellectual reaction to the surge of urbanization and urbanism (Baldassare 1978; Booth and Edwards 1976; Booth et al. 1980; Choldin 1978; Edwards and Booth 1977; Galle, Gove, and Mcpherson, 1972; Gillis 1974; Gove, Hughes, and Galle 1979; Gove and Hughes 1980; Levy and Herzog 1974; Stokols 1978). Classical discussions, including Simmel's "the stranger" (2008, 323–327), Durkheim's "social anomie" (1974), and Putnam's "Bowling

along" (1995, 188–196), even suggested that increasing population density might be detrimental to people's generalized trust.

In general, scholars have widely demonstrated the detrimental effects of density/crowding on human health and behavior, including aggregate suicide, mortality, crime, imprisonment, divorce, and public welfare, and others (Choldin 1978). While sociologists had focused on ecologic research at the community level in 1970–1980s, psychologists had explored "density-pathology" at the individual level. Density and its closely related indicators, such as crowding, privacy, personal space, and territoriality, to name a few, are found to affect human behavior and subjective wellbeing. In particular, "high density can at times independently impair the quality of situations by promoting behavioral constraints, stimulation overload, reduced privacy, overmanning, and negatively labelled arousal resulting from personal space violation" (Stokols 1978, 272, quoted in Altman, 1975; Baum and Valins, 1977; Desor 1972; Esser 1973; Evans 1979; Patterson 1976; Proshansky, Ittelson, and Rivlin 1970; Saegert 1973; Schopler and Stokols 1976; Stokols 1972; Sundstrom 1975).

However, so far, there has been little empirical evidence linking population density to generalized trust or examining the mechanisms of the relationship between these two factors.

The "fight versus flight" mechanism

Considering the mechanisms linking density and pathological results, Regoeczi (2002) suggested that the role of density can be explained mainly via "*fight versus flight,*" two mechanisms proposed by ethologists (McBride 1971). The "*flight*" argument is based on the idea that too much social interaction gives rise to social overload (Baum and Koman 1976); thus, withdrawal functions as a self-protection and escape mechanism (Booth 1976) by tuning out social stimulation to reduce social overload (Baum and Paulus 1987; Evans, Lepore, and Allen 2000). The "*fight*" argument draws much on animal studies showing that population density predicts aggressive behavior (Booth 1976; Calhoun 1962; Lorenz 1967; van den Berghe 1974). That is, when it comes to human behavior, density and crowding can produce tension and frustration (Beasley and Antunes 1974), criminality, conflicting norms, and anomie (Wolfgang 1970). In sum, the high density may give rise to various detrimental social results either by creating stimulated aggression among individuals due to resource competition and stress or by leading to social withdrawal for protection and escape (see Regoeczi 2002 for a review).

As mentioned before, if the density-pathology hypothesis is correct, one can naturally conjecture that density is also likely to matter for generalized trust, as trust can be similarly affected by density via either

"*fight*" or "*flight*." For example, the higher density may lead to self-isolation and withdrawal from social life, further decreasing generalized trust by lowering the frequencies of social interactions. In much the same way, resource competition led by high density is most likely to decrease generalized trust among individuals by increasing aggregation behaviors, such as crimes, violence, and other forms of social anomie. Furthermore, high density, as a demographic change, can often be a result of institutional factors (for instance, ending of the family-planning policy or fastened urbanization process) and therefore may give rise to various forms of social anomie due to the intrinsic problem originated from the political and policy level, which further deteriorates trust towards general others. However, little has been known about the intriguing density-trust link, despite the extensive literature on both constructs.

To the best knowledge of the authors, Knack and Keefer (1997) conducted the only empirical sociological study on the density-trust link based on a country-level cross-section of 29 samples. Unfortunately, the link between density and economic outcomes was revealed merely in an auxiliary analysis of the research. They just stated that "we also explored the effects of several other possible determinants of trust and civic cooperation which are less well-developed conceptually here for reasons of space. Urbanization, population, population density, and government size all proved insignificant" (Knack and Keefer 1997, 1283), without reporting detailed statistical results. Overall, using density at the state level to analyze its effects on human behavior is way too coarse. According to Choldin (1978), the county can be an appropriate level for ecological studies when looking into the role of population density.

On the other hand, we note that there may be other directions of effects between population density and generalized trust. Increasing population density may improve people's knowledge and tolerance of strangers, and eventually raise their trust in others in the long run. For instance, increasing population density may lead to an increase in ethical diversity, which, as demonstrated by some studies, improves people's trust in certain circumstances (Hooghe et al 2009; Alecu 2021; Choi and Lee 2021). Thus, empirical evidence is needed to distinguish the impact of population density on generalized trust.

China case: trust radius and *hukou* "friction"

Though trust is a globally homogenous phenomenon, it varies across countries. Such differences often result from how people perceive "most people" or the trust radius of the country. As Delhey, Newton, and Welzen (2011) discovered, countries with a strong Confucian heritage and collective nature of social relation, like China, have a narrow trust

radius due to the fact that the notion of "most people" is more in-group connoted than out-group connoted by their people. As a result, generalized trust among the Chinese generally develops more from interactions with in-group members, such as family, friends, colleagues, and personal acquaintances, unlike in Western societies where out-group interactions (i.e., interactions with strangers or people belonging to different religions, races, and social groups) mainly shape people's generalized trust. Importantly, given the relatively short trust radius in China, "*fight*" or "*flight*" may play a less important or even insignificant role in forming the density-trust link because both are mainly premised upon social interactions with out-group members, which are not the bedrock of generalized trust among the Chinese. This thus points to the possibility that neither "*fight*" nor "*flight*" mediate the relation between density and trust in China, if any.

China is also a country where massive rural to urban migration has become a major component of regional population growth, driving the industrialization, urbanization, and economic growth of the country through decades of strict family-planning policy. Past four decades have been marked by a remarkable growth of China's socio-economic status. Behind such transformation is the underappreciated changing demography. Ascribed to China's strict family-control policies since the 1970s, total fertility rates have dropped from 5.81 in 1970 to 1.55 by 2013, far below the world average of 2.51, impeding the population growth in China (National Statistical Bureau 2015). Today, what better defines China's demographics is internal-migration, particularly rural-urban migration in cities. These rural migrants, who account for two thirds of the total workforce in China (China Federation of Trade Unions 2010), are the assets of the country's industrialization; however, bounded by *hukou* status, they are facing a number of practical challenges brought on by social cleavage in the destination cities (Chen and Zhang 2015; Ma 2010).

Established in the 1950s, the *hukou* system assigned people to agricultural/rural hukou status or non-agricultural/urban hukou status with a sharp differentiation of rights and privileges (Chan and Zhang 1999; Li, Gu, and Zhang 2015). Since the 1980s, despite the influx of rural migrants due to relaxation of hukou-based administrative control, the *hukou* system was never challenged, maintaining the rural-urban divide. As Putnam (2000, 260) has stated, "great disparities of wealth are inimical to widespread participation and broadly shared community integration." Urban locals remain the privileged group, occupying most of the elite positions. They are eligible for various social welfare programs, subsidies, and job-related benefits, while rural migrants often enter physically demanding, low-skilled occupations with little benefits (Knight, Song, and

Huaibin 1999; Wang, Zuo, and Danching Ruan 2002). At the macro level, the inflow of rural migrants would inevitably increase the population density of the destination region. However, regarding rural-urban migration, segmentation outweighs competition through a self-reinforcing "segregative" process for average rural and urban hukou holders (Knight and Yueh 2008), leading to *hukou*-based occupational segregation. Such occupational segregation forms a kind of resistance, or a "*friction*" to integration. It has bee well-studied that social segregation has a detrimental effect on generalized trust (Delhey and Newton 2005; Hamamura 2012; Javier 2015; Barone and Mocetti 2016), which brings a negative connection between population density and generalized trust, in particular distrust towards out-group people. For both migrants and urban locals, this type of distrust towards out-group members further lowers their overall trust towards general others. This suggests that *hukou* restrictions may explain the detrimental effect of population density on generalized trust in the Chinese context.

Note that distrust towards out-group members rising from "*friction*" does not need to involve direct and frequent social interactions with out-group members; rather, it can be formed and reinforced by social interactions with in-group members (e.g., migrant with fellow migrants, urban hukou residents with fellow residents). On the one hand, occupational segregation is achieved through job assortative matching via average characteristics relevant to *hukou* status. The rural *hukou* migrants and urban *hukou* residents are therefore both institutionally isolated and locked-in in certain occupations, largely decreasing the daily opportunities of direct interactions with their out-group members. The isolation is further strengthened by the segregation of residential locations in urban lands, as migrants tend to live in enclaves to obtain support while urban residents live in well-established family compounds and communities. On the other hand, distrust and its related emotions can be relayed and strengthened as a collective memory or experiences through in-group interactions, leading to an internalization of distrust towards *hukou,* as defined by out-group people. Overall, unlike "*fight*" or "*flight*" mechanisms, when migration flows improve local population density in China, for both rural-urban migrants and urban locals, "*friction*" caused by *hukou* can directly decrease generalized trust through institutionalized segregation and internalized beliefs towards out-group general others.

Consequently, drawing on previous studies, we aimed to extend the density-pathology hypothesis to wider sociological study, particularly generalized trust, to empirically examine whether population density impairs generalized trust. If there is a density-trust relation, which of the three mechanisms, "*flight,*" "*fight,*" or "*friction,*" is at work in the context of China.

Methods

Data

The rich data from the Chinese General Social Survey (CGSS), a nationally representative survey project, offer us the opportunity to explore the potential link between density and trust. Using multi-stage stratified national probability sampling, each wave of the CGSS covers around 5,000–12,000 households sampled in mainland China. From 2010 to 2013, the CGSS collected survey data from 11,785, 5,620, 11,765, and 11,438 rural and urban respondents across four waves, respectively. We focused on urban residents and removed people younger than 18 and older than 70. Due to missing values on variables of interest, the effective pooled sample comprised 17,331 urban respondents from 119 counties in 30 provinces, covering all mainland China provinces except for Tibet. When performing county-level panel analysis, we dropped 5 counties that were surveyed only once to obtain an unbalanced panel dataset of 384 observations from 114 counties. Among them, 51 were surveyed across all four waves, 54 across three waves, and 9 across two waves.

Owing to the sampling design, respondents were chosen from households with different numbers of adults. To account for the unequal probability of selection arising from varying household size, we therefore computed household weights for each sample. Moreover, for each wave, we further used sampling weights to compute representative figures for the annual general population in China. Case weights were used for both descriptive statistics and model estimation[1]. A similar method can be found in Chen and Williams (2016) and Wu and Treiman (2004). Finally, the county level data, including population density, economic development, and crime rates, were extracted for various years from the Statistical Yearbook of those counties and the website of China Judgments Online.

Independent variables: density

The independent variable, population density at the county level, was calculated as the population number (10,000) per square kilometer within the county in the years 2009–2012. The time lag was used to avoid mutual causality problem. The highest density of 44,195 persons per square kilometer (/km^2) was found for Huangpu District of Shanghai in 2011 while the lowest density of less than 5 persons/km^2 was found for Xunke County in Heilongjiang Province in Northeast China. The average population density for all 119 counties combined was 4,273 persons/km^2 during the study period. Note that in geography, the high-density region is defined as areas with more than 1,500 persons/km^2 (Tan et al. 2018).

In our data, 36 out of 119 counties have higher density compared to 1,500 persons/km^2.

Due to the potential measurement error of local census of population in China, we also considered an alternative measure of population density, specifically, the nighttime light (NTL) of the county, as previous studies have shown a very close relationship between NTL, population density, and economic activity (Anderson et al. 2010; Cheng et al. 2007; Doll and Muller 1999; Elvidge et al. 1997; Henderson, Storeygard, and Weil 2012; Lo 2001; Sutton et al. 1997; Sutton 2003), and recent studies further revealed that it can be used as a good proxy for population and establishment density (Mellander et al. 2015; Tan et al. 2018). Specifically, we exploited the NTL Data provided by the U.S. National Oceanographic and Atmospheric Administration (NOAA). The observations on which the data is assembled are produced by the Defense Meteorological Satellite Program-Operational Linescan System (DMSP-OLS)[2]. The radiance-calibrated NTL levels of 119 counties were extracted from DMP satellite of F16 and F18 (2009–2013)[3]. The DMSP-OLS imagery has a spatial resolution of about 1 km. We extracted the mean value of NLT level for each county, which ranged from 0.22 (Chengkou County in Chongqing) to 170.32 (Dongcheng District in Beijing)[4] with the mean value of 36.36. Note that to remove the heterogeneity of population density, we took the logarithm for both of the measures.

Dependent variable: trust

Generalized trust among the Chinese was measured using a single item, "Generally speaking, do you agree that most people can be trusted?" on a 5-point ordered scale, "strongly disagree," "somewhat disagree," "neither agree nor disagree," "somewhat agree," and "strongly agree." Around 53% of respondents reported "somewhat agree" and 10% "strongly agree," which is consistent with previous findings (Delhey and Newton, 2005). Note that Delhey, Newton, and Welzel (2011) found that the trust radius of "most people" among the Chinese is shorter, meaning that the originally reported trust level among the Chinese is slightly overestimated in comparison with other countries. However, in our research setting that focused on Chinese samples, this does not pose any threats.

Mediators: flight, fight, and friction

Since out explanatory variable is county population density, the potential mediators were also constructed at the county-level. This also allows us

to compare the three potential mechanisms at the same aggregate level because "*flight*" and "*fight*" can be measured at individual level[5]. To capture "*flight,*" or social withdrawal at the county level, we used the annual county average of socializing behavior derived from individuals responses to a single question, "How often did you socialize in your leisure time in the last year?," measured on a 5-point ordered scale, "never," "seldom," "sometimes," "often" and "always." For respondents, the sparser social life they have, the higher possibility they "flight" away from social engagement. We noticed that CGSS contains a seemingly related item, which asks respondents to report frequencies of "getting together with friends in the last year." However, due to a different understanding of "friends," this item could, in fact, indicate either active social involvement or social isolation because of the homophily feature of ego-centric networks (Galle, Gove, and Mcpherson, 1972). In this regard, we chose the individually reported level of "socializing" rather than "getting together with friends" to assess "*flight.*" Among the individual samples, approximately one quarter reported "often" or "always" on socializing while 44% reported "never" or "seldom." The county-level socializing measures ranged between 0.57 (Yingjisha County 2012 in Xinjiang) and 1.28 (Fengtai District 2013 in Beijing).

In terms of "*fight,*" we proxied the county level of social anomie using the density of legal cases within the county, including civic cases of disputes between persons or organizations as well as criminal cases involving actions harmful to society. Specifically, for each county, we used Python 12.0 to archive the annual number of civic and criminal cases trialed by the county court between 2010 and 2013 from the China Judgments Online (CJO)[6]. The CJO is run by China's Supreme People's Court that contains more than 63 million judgment rendered by Chinese courts from 1996 as of the end of 2018. According to the Supreme People's Court (SPC)'s provisions, the judgment documents made by all the Chinese courts should be archived on this website. Among 110 counties in our study, the archived annual number of legal cases ranged from 2 (Xunke County 2010 in Heilongjiang Province with a population of 80,000) to 15,508 cases (Boan County in Shenzhen with a population of 1.26 mil.). Normalizing the population using county area, we obtained the density of legal cases, with Yunhang District in Hangzhou being the highest county while Yingjisha County in Xinjiang being the lowest. Nevertheless, a large number of judgment documents might not have been archived through the Internet; thus, for robustness check, we also used city-level search volumes for drugs and nightclubs on Baidu, the largest online searching engine used by the Chinese, to proxy "*fight.*"

To measure "*friction,*" we constructed the occupation-*hukou* segregation index using respondents' *hukou* status and their occupational

prestige within a county. Specifically, for each county, we divided the occupational prestige measured by international socio-economic index (ISEI) into 10 quantiles. By counting the number of rural and urban *hukou* holders in each ISEI quantile, we calculated the exposure measure for each county. The formula can be written as follows:

$$Friction = \sum_{i=1}^{10} \left(\frac{U_i}{U_{Total}} \cdot \frac{R_i}{U_i + R_i} \right),$$

where U_i denotes the number of people holding urban hukou in ISEI quantile i, R_i denotes the number of people with rural hukou in ISEI quantile i, and U_{Total} is the total number of urban *hukou* holders in that specific county. This formula can be understood as the product of *hukou* composition, $R_i/(U_i + R_i)$, or the percentage of rural hukou holders in ISEI quantile i, and the distribution of urban *hukou* holders U_i/U_{Total}, or the percentage of urban *hukou* holders in ISEI quantile i among all urban *hukou* holders in the county. Therefore, this is essentially a measure of average *hukou* composition of each ISEI quantile for average urban *hukou* holder that captures the degree of potential contact or the possibility of interaction between rural and urban *hukou* holders. In the presence of extensive segregation, this measure will approach 0, and when no segregation is present, this measure will be close to the percent of rural *hukou* holders for the county.

Control variables

A long list of other individual attributes may be associated with trust. In this study, we controlled for demographic characteristics (age, gender, years of schooling, and marital status), socioeconomic factors (residential status, work status, Chinese Communist Party membership, and family annual income), and social life factors (individual level of socializing). At the county level, we controlled for GDP per capita and local income inequality to capture the overall level of socioeconomic development and cohesion at the aggregate level, which are very likely to be correlated with both population density and individual trust. The annual GDP and population data were gleaned from the websites or yearbooks of the relevant county governments, and the annual county-level income inequality was calculated in the form of Gini coefficient using household income reported by the respondents. Besides, we controlled for the fixed effects of four waves (year) and province dummies to rule out the shocks of time and macro-level factors. Key statistics of major controls are presented together with the dependent variable, independent variables, and potential mediators in Table 1.

Model strategies

Early sociological works examined the density-pathology hypotheses mainly at the aggregate level due to data availability as well as the eco-logic perspective, which was popular in 1970–1980s. With both large-scale representative microdata and county-level data at hand, we aimed to examine the density-trust link both logistically at the individual level and ecologically at the county level. Comparing the results from both levels, we then provided an additional instrumental analysis as a robustness check to take care of the potential confounding problem.

For individual-level analysis with around 17,311 samples, given that trust is measured on a 5-point scale, we used ordered logit regression, as it relaxes the assumption that the intervals between points on the well-being scale are equal. More importantly, we fit multilevel/hierarchical ordered logit models to predict generalized trust because the core explanatory variable, population density, was at the aggregate county level. Considering potential unobserved or unmeasured confounders that may associate with both density and trust, we further performed an auxiliary instrumental variable analysis using county's altitude as the source of exogenous variation (Figure 1a). We conducted a multi-level ordered logit

Table 1. Selected descriptive statistics of weighted samples ($N = 17{,}331$).

Individual-level attributes					
		Percentage			Percentage
General trust	Strongly agree = 5	8.29	Socializing	Always = 5	3.73
	Somewhat agree = 4	51.73		Often = 4	22.60
	neither agree nor disagree = 3	12.87		Sometimes = 3	33.25
	Somewhat disagree = 2	22.18		Seldom = 2	30.49
	Strongly disagree = 1	4.93		Never = 1	9.93
Marital Status	Married	85.37	Political status	CCP member	16.49
	Single/divorced/widowed	14.63		None CCP	83.51
Work Status	Employed	62.27	Survey wave	Year = 2010	24.82
	Laid-off/never worked/retired	37.73		Year = 2011	24.94
Hukou Status	Residents with urban *hukou*	70.93		Year = 2012	25.06
	Rural migrants	29.07		Year = 2013	25.18
Gender	Male	50.32			
	Female	49.68			

	Mean	*S.D.*	*Min.*	*Max.*
Age	45.42	14.54	18	80
Years of Schooling	10.39	3.99	0	19
Family Annual Income (RMB)	82,372	126,772	2,055	3,866,683
County-level Attributes				
Population Density 1 (person/km^2)	4,528	8,839	4.61	44195
Population Density 2 (Nighttime light value)	48.69	58.63	.22	170.32
GDP per capita (RMB, CPI adjusted)	39,345	13,862	20,272	69,754
Income inequality (household)	.048	.02	.02	.14
Flight: Average socializing	2.76	.30	1.77	3.6
Flight: Legal cases	1197	2544	0	15508
Friction: *Hukou*-based Occupational Segregation	.20	.18	0	.88
Altitude	289.62	486.30	0	2246

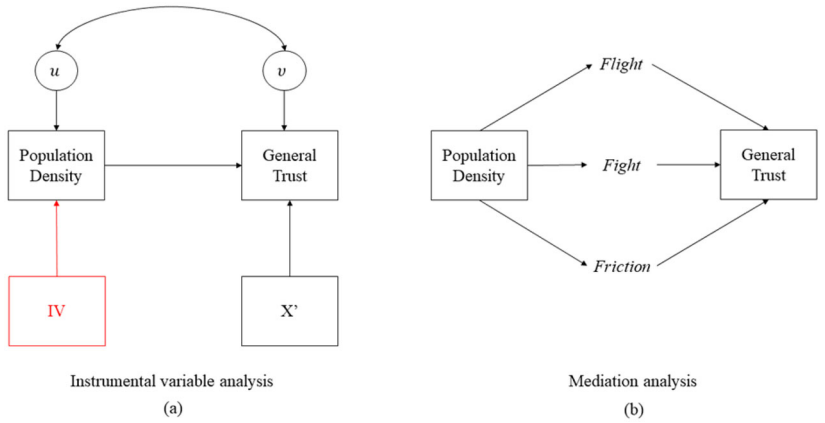

Figure 1. Simplified analytical sketch for density-trust link.

model and its instrumental variable estimation using the generalized structural equation approach with the command of "gsem" in Stata 15.1. We also used "gsem" to evaluate the mediation effect, which is capable of correctly dealing with the problem of different scale parameters of error terms when comparing uncontrolled and controlled coefficients between nested non-linear models (see Figure 1b).

Utilizing a static panel model, we conducted a macro-level analysis to probe the density-trust link at the county level using 384 observations from 114 counties. Considering the panel autocorrelation, we fit panel-specific AR1 auto-correlation structure using the "xtgls" command in Stata 15.1. Furthermore, we also estimated mediating effects at the aggregate level using the generalized structural equation models, as naïve Sobel-Goodman test cannot yield cluster-robust standard errors, although the dependents are continuous variables. In fact, for both individual level and county level analyses, we adjusted standard errors for regional clustering at county or province.

Results

The Density-Trust link

To illustrate the potential relationship between population and trust, we drew the scatterplot of these two variables at the county level, as illustrated in Figure 2. The upper panel presents the association between the logarithm of the de-facto county-level population and trust level, whereas the lower panel presents the association between night light and county trust level. Clearly, both measures of population density revealed a negative density-trust relationship. We further smoothed the pattern using the

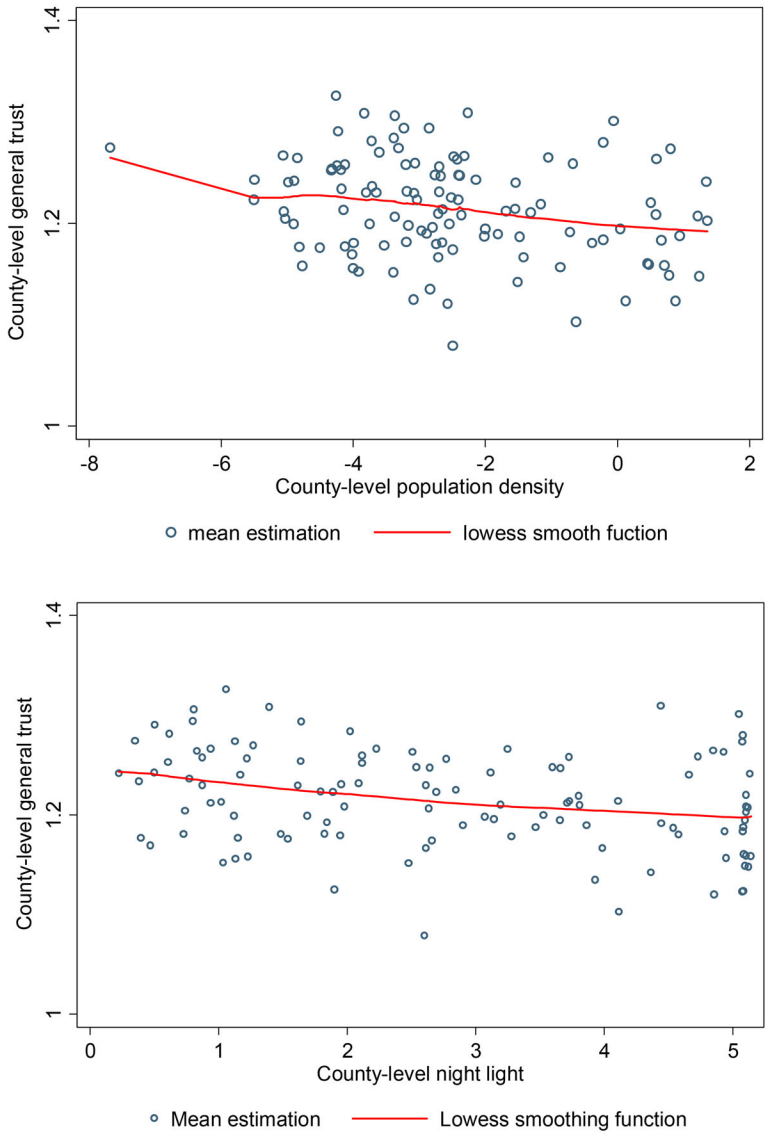

Figure 2. The scatterplot of county-level population density and general trust. *Note*. We use logarithm of de facto population density (upper panel), and night light (lower panel) as a measure of county-level population density.

lowess (locally weighted scatterplot smoothing) function. The downward slope suggested a similar pattern. To evaluate such relationship statistically, we continued with the following analysis.

Both ordered logistic regression and multilevel/hierarchical model results are shown in Table 2. We started with a baseline single level

ordered logit model that included only the county population density and the sets of demographic and socioeconomic controls (Table 2 Model 1). Subsequently, we tested Model 2 in which we adopted the same model specification as in Model 1 using a different measure of density proxied by nighttime light (NTL). To account for the nested data structure, where individuals were nested within the county, we adopted two-level ordered logit models with the random intercept at the county level and presented the results in Model 3 and Model 4. As clearly shown in Table 2, both single-level and two-level models showed that population density is negatively associated with individuals' trust level. Regarding other trust determinants, despite the varying magnitude, both education and income were positively associated with generalized trust, consistent with previous studies (Newton 1999; Orren 1997; Putnam 2000; Whiteley 1999).

Considering the unobserved heterogeneity that potentially varies across models, we followed the standard practice and presented average partial effect of population density (Mood 2010; the results are not shown, but are available upon request). For instance, according to Model 3, the average partial effect predicting the highest trust level (trust = 5) derived from ordered logits for a unit increase of logarithm of population density was 0.005, meaning that 1 unit increase in logarithm of population density, or the de facto population density increase by 27.2 thousand per square kilometer, would decrease an individuals' probability of reporting the highest trust level on average by 0.005. In a metropolitan city, like Shanghai, the population density of some districts is over 40 thousand people per squared kilometers. If population density would decrease by 20 thousand people per squared kilometers, then the probability of reporting the highest trust level would increase by 0.003. The magnitude of the effect is very considerable, as it is comparable to the difference led by a three-more-year's education. Other things being equal, if one chose to live in Shanghai while the other chose to live in a country with the national average population density, which is around 1/10 density of Shanghai, the difference in the probability of reporting highest trust level between them would be 0.012, which is comparable to the effect of being employed or not or being a party member or not. When using night lights as a measure of population density, the result of the average partial effect remained. Furthermore, we tested for nonlinear effects between population density and generalized trust by adding quadratic and cubic terms of population density in the ordered logit and multilevel ordered logit models. We found no significant coefficients for either the quadratic or cubic terms, further supporting the results in Table 2.

Table 2. The determinants of general trust in urban China, 2010–2013.

	Model 1 Ologit	Model 2 Ologit	Model 3 Multi-level Ologit	Model 4 Multi-level Ologit
Population Density 1	**−0.060***(0.014)**	–	**−0.071***(0.014)**	–
Population Density 2	–	**−0.076***(0.017)**	–	**−0.084***(0.019)**
Age	0.019***(0.002)	0.019***(0.002)	0.020***(0.002)	0.019***(0.002)
Male	0.019(0.036)	0.018(0.036)	0.016(0.036)	0.016(0.036)
Years of Schooling	0.019**(0.006)	0.019***(0.006)	0.021***(0.006)	0.021***(0.006)
Family Income (log)	0.056*(0.024)	0.064**(0.023)	0.067**(0.024)	0.070**(0.024)
Married	0.066(0.042)	0.066(0.042)	0.072^{+}(0.042)	0.072^{+}(0.042)
Employed	0.145***(0.043)	0.143***(0.043)	0.132**(0.044)	0.132**(0.044)
Urban *hukou*	0.001(0.043)	0.002(0.043)	0.043(0.043)	0.043(0.043)
CCP Member	0.153**(0.047)	0.153**(0.047)	0.146**(0.047)	0.145**(0.047)
Socializing				
Seldom	−0.113(0.148)	−0.103(0.148)	−0.137(0.146)	−0.133(0.146)
Sometimes	−0.118(0.124)	−0.113(0.124)	−0.127(0.122)	−0.125(0.121)
Often	−0.009(0.117)	−0.006(0.116)	−0.023(0.117)	−0.022(0.116)
Always	0.104(0.131)	0.106(0.130)	0.087(0.131)	0.087(0.131)
GDP per capita (log)	−0.003(0.004)	−0.002(0.004)	−0.000(0.005)	0.000(0.005)
Income Inequality	0.769(1.633)	0.026(1.621)	1.370(1.648)	0.954(1.683)
Wave Dummies				
2011	−0.141*(0.064)	−0.140*(0.064)	−0.160*(0.067)	−0.160*(0.067)
2012	−0.101(0.077)	−0.107(0.076)	−0.104(0.078)	−0.105(0.078)
2013	−0.458***(0.070)	−0.482***(0.072)	−0.472***(0.074)	−0.482***(0.075)
Random intercept	–	–	0.045(0.010) ***	0.044 (0.009)***
Cutoff Point 1	−1.200 (0.297)	−1.511 (0.286)	−1.003 (0.298)	−1.399 (0.289)
Cutoff Point 2	0.791 (0.290)	0.481 (0.280)	0.999 (0.292)	0.603 (0.282)
Cutoff Point 3	1.388 (0.287)	1.076 (0.276)	1.602 (0.290)	1.206 (0.280)
Cutoff Point 4	4.256 (0.293)	3.945 (0.282)	0.999 (0.292)	4.103 (0.286)
Observations	17,331	17,331	17,331	17,331
Log-Likelihood	−22,159.881	−22,159.731	−22,104.688	−22,104.793

Notes. (1) Population Density 1: density measured by person/km^2 within the county; Population Density 2: density proxied by county mean of NTL values from DMSP-OLS). (2) Estimations are based on weighted data; robust standard errors adjusted for clustering on counties are shown in parentheses. (3) Reference categories: female, non-CCP membership, single/divorced, unemployed/retied/never work, rural-to-urban migrants, never socializing, year 2010, and Beijing. (4) ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, $^{\dagger}p < 0.10$ (two-tailed tests). Bold values indicates the interested coefficients of our explaination variables (Explaination Variable).

Auxiliary instrumental variable analysis

As mentioned above, we used the level of population density of prior year to predict trust level in the survey year to partial out the possibility that density-trust relationship may run the other way. Besides, some unobserved individual or county level factors might still be associated with density and trust, leading to biased estimation. We thus provide a robustness check on this interpretation by using county's altitude as an instrumental variable (IV) for population density.

Altitude should meet two criteria to become a valid IV. First, it should be associated with the density. Such correlation is reasonable as natural living conditions, in particular, the concentration of oxygen and topography change according to altitudes. Specifically, the human body performs best at sea level, and the saturation of oxyhemoglobin decreases as altitude increases. Terrains in high altitude regions are often rough, rugged, and difficult for transportation and agriculture production. Although the human body has both short-term and long-term adaptations to altitude, a universal phenomenon is that low altitude regions are generally more populated compared to high altitudes. The altitude-density relationship could be statistically tested in the present study. Second, IV should satisfy exogenous restriction, meaning that altitude affects trust only through density. In terms of the exogeneity of the IV, under certain assumptions, the altitude of a county can be taken as exogenous, as it was randomly determined by secular and large-scale diastrophism, especially considering within-province variation (that is, after controlling for the fixed effects of the province in the model specification) (Table 3).

Still, one may argue that the altitude may not be exogenous because it may affect generalized trust directly through some long-term adaptions (e.g., genetic factors) rather than through population density. For instance, people in high altitudes, such as Himalayas or Alps, may have developed higher level of hospitality and trust due to inherited characteristics of the genetic conditions, which can be traced back to the survival strategy of their ancestors in the ice age. After all, the saturation of oxyhemoglobin of human body begins to decrease rapidly beyond 2,100 meters above sea level (Young and Reeves, 2002). However, as is clearly shown in the last row of Table 1, our 17,331 samples inhabited areas located 0 to 2,246 meters above the sea level, with the mean value of 289 meters. That is, none of our samples inhabited high altitudes (often defined by 2400 meters above sea level), suggesting that the genetic or other biological adaptation factors due to high altitudes can hardly be a mechanism through which altitude directly affect trust.

Table 3. The determinants of general trust using IV method.

	Model 1		Model 2	
	Trust	Density 1	Trust	Density 2
Population Density 1	−0.132***			
	(0.039)			
Population Density 2			−0.158***	
			(0.047)	
Altitude		−0.484***		−0.392***
		(0.095)		(0.073)
Years of Schooling	0.025***	0.053***	0.026***	0.049***
	(0.006)	(0.009)	(0.006)	(0.008)
Age	0.021***	0.014***	0.020***	0.009***
	(0.002)	(0.002)	(0.002)	(0.002)
Male	0.012	−0.052	0.012	−0.048†
	(0.036)	(0.033)	(0.036)	(0.026)
Married	0.041	−0.383***	0.043	−0.295***
	(0.047)	(0.051)	(0.047)	(0.044)
Employed	0.133**	−0.009	0.127**	−0.052
	(0.045)	(0.042)	(0.045)	(0.035)
Urban hukou	0.057	0.173†	0.058	0.149†
	(0.043)	(0.090)	(0.044)	(0.081)
CCP Member	0.135**	−0.112*	0.134**	−0.093**
	(0.046)	(0.044)	(0.046)	(0.035)
Family Income (log)	0.086**	0.200**	0.098***	0.269***
	(0.027)	(0.070)	(0.030)	(0.050)
Socializing				
Seldom	−0.134	0.055	−0.119	0.165
	(0.148)	(0.124)	(0.149)	(0.107)
Sometimes	−0.135	−0.077	−0.124	0.023
	(0.122)	(0.084)	(0.122)	(0.071)
Often	−0.027	−0.056	−0.021	0.008
	(0.117)	(0.076)	(0.116)	(0.064)
Always	0.078	−0.089	0.081	−0.047
	(0.132)	(0.082)	(0.130)	(0.062)
GDP per capita	0.001	0.010	0.003	0.020*
	(0.005)	(0.012)	(0.005)	(0.010)
Income Inequality	−0.744	−23.644***	−1.906	−28.185***
	(2.090)	(6.030)	(2.374)	(5.481)
Wave dummies				
2011	−0.160*	0.030	−0.158*	0.049
	(0.067)	(0.141)	(0.068)	(0.110)
2012	−0.115	−0.071	−0.121	−0.119
	(0.077)	(0.101)	(0.077)	(0.085)
2013	−0.504***	−0.280†	−0.538***	−0.509***
	(0.074)	(0.151)	(0.077)	(0.124)
N	17331		17331	
Log-Likelihood	−52,364.919		−48,313.810	

Notes. (1) Population Density 1: density measured by persons/km^2 within the county; Population Density 2: density proxied by county mean of NTL values from DMSP-OLS). (2) Estimations are based on weighted data; robust standard errors adjusted for clustering on counties are shown in parentheses. (3) Reference categories: female, non-CCP membership, single/divorced, unemployed/retied/never work, rural-to-urban migrants, never socializing, year 2010, and Beijing. (4) $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.10$ (two-tailed tests).

We present the IV results obtained from multi-level ordered logit models with random intercepts at the county level in Table 2. The trust model is two-level ordered logit model whilst the density model is the

Table 4. Testing for mediating effects in multi-level ordered logit models ($N = 17{,}331$).

X = Population density 1	Mediator = ***flight***		Mediator = ***fight***		Mediator = ***friction***	
	Coef.	*p*-Value	Coef.	*p*-Value	Coef.	*p*-Value
Effect of density in reduced model *Total Effect*	−.071	0.000***	−.070	0.000***	−.062	0.000***
Effect of density in full model *Direct Effect*	−.072	0.000***	−.068	0.000***	**−.032**	**0.065**†
Mediated Effect *Indirect Effect*	.001	0.792	−.002	0.609	**−.030**	**0.004****
X = Population density 2	Mediator = *flight*		Mediator = *fight*		Mediator = *friction*	
	Coef.	*p*-Value	Coef.	*p*-Value	Coef.	*p*-Value
Effect of density in reduced model *Total Effect*	−.084	0.000***	−.084	0.000 ***	−.072	0.000***
Effect of density in full model *Direct Effect*	−.086	0.000***	−.083	0.000***	**−.026**	**0.283**
Mediated Effect *Indirect Effect*	.001	0.802	.000	0.970	**−.046**	**0.002****

Note. (1) Population Density 1: density measured by person/km^2 within the county; Population Density 2: density proxied by county mean of the NTL values from DMSP-OLS). (2) ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, †$p < 0.10$ (two-tailed tests).(3) Controls as per models in Table 2. Note that the role of density in trust in the reduced form model is different from that obtained from Model 3 in Table 2 because it has been correctly adjusted to allow for a direct comparison of uncontrolled and controlled coefficients between nested nonlinear models (see endnote 7). Bold values indicates the interested coefficients of our explaination variables (Explaination Variable).
Directly comparing uncontrolled and controlled coefficients between nested nonlinear models is problematic because the scale parameter of the error terms of a full model is smaller than that of a reduced model. The coefficients in Table 3, obtained from using the Stata command gsem, were decomposed correctly and are consistent with results derived from models using the solution proposed by Karlson, Holm and Breen (2011). We in fact tested for this by comparing the results of a single-level model processed by gsem and khb and found that the coefficients were exactly the same.

OLS model. Although not reported in Table 4, the absolute Z values from models predicting density using altitudes were over 5.0, sufficiently large to ensure no weak IV problem. Consistent with findings in Table 2, the IV estimates show that the role of density in trust is indeed negative and highly significant. Furthermore, the magnitudes of IV estimated effects of density in Table 4 are 0.132 and 0.158, which are slightly larger compared to those obtained from Model 3 and Model 4 in Table 2 (0.071 and 0.084). Note that the Bayesian Information Criteria (BIC) statistics further show that BIC value of the model estimation with IV approach is much larger compared to the one without it (results not shown, but available upon request). Accordingly, the models using IV did not perform better. Therefore, we adopted the original multi-level ordered logit estimates in Table 2, which were more efficient.

The mediators: Flight, fight, or friction

In the next step, we examined the mechanism that might account for the association between population density and generalized trust in urban

China. Specifically, we added three potential mediators separately into the Model 3 and Model 4 of Table 2 and then examined whether including them in models significantly decreases the effect of the density on trust. As is shown in Table 4, controlling for the same covariates as those in Table 2 (although we only report the effects of density in full model and reduced models as well as the mediated effects) while adding either "*fight*" (legal cases per capita) or "*flight*" measure (frequencies of socializing) in the models barely change the size of density coefficient on trust, regardless of the measurement of density.

In contrast, the inclusion of "*friction*" (occupational segregation based on *hukou* restrictions) strikingly decreased the coefficient almost by half, from −.057 to −.030 when measured by log values of person/km^2 and from −0.069 to −0.026 when measured by log values of nighttime light, with both being no longer significant at 0.05 alpha level (see in full models). Additionally, "*friction*" mediated 47.37% and 62.32% of the total effect of population density, as measured by log values of person/km^2 (the upper panel) and by log values of nighttime light (the lower panel) within the county, respectively. Overall, all of these results imply that occupational segregation, rather than stimulated aggression behavior (*fight*) and withdrawal from social life (*flight*), fully mediate the effect of population density on generalized trust among the Chinese urban residents are, suggesting that "*friction*" matters in the Chinese context.[7]

Analysis at aggregate level

For many years, the ecological fallacy, a formal fallacy in the interpretation of individual-level behavior from the aggregate-level pattern, has been the most challenging statistical problem in social sciences (van Poppel and Day, 1996). Scholars believe that, applying conclusions directly from group macro level to individual micro level is often unreliable, since when shifting from macro to micro level, "we are very likely to affect the manner in which outside and possibly disturbing influences are operating on the dependent and independent variables"(Blalock 1964, p.97).

Ecological fallacy is much often the problem of construct validity. Despite its ubiquity, we should be aware that the recognition of such validity can increase the vigilance of the problem. Rather than avoidance, we should conduct more cross-level comparisons and try to identify the source of fallacy, or at least show the degree to which macro-level patterns match micro level. Besides, based on a widespread consensus, longitudinal data are always the ideal type of survey data for causal inference. By pooling the county-level data each year, we created county panels

Table 5. Panel analysis predicting density-trust link.

	Model 1	Model 2
Population Density 1	**−0.006*** (0.001)**	
Population Density 2		**−0.011*** (0.002)**
Age	0.115*** (0.019)	0.118*** (0.033)
Male	0.009 (0.008)	0.013 (0.012)
Years of Schooling	−0.039** (0.014)	0.015 (0.023)
Family Income (log)	−0.148*** (0.045)	−0.115 (0.080)
Married	−0.011 (0.016)	−0.005 (0.025)
Employed	0.036*** (0.008)	0.031* (0.013)
Urban *hukou*	0.003 (0.008)	−0.006 (0.017)
CCP Member	0.016*** (0.003)	0.005 (0.006)
Socializing		
Seldom	0.016 (0.016)	−0.016 (0.037)
Sometimes	0.046*** (0.013)	0.005 (0.033)
Often	0.069*** (0.016)	0.024 (0.035)
Always	0.090* (0.037)	−0.004 (0.071)
GDP per capita (log)	0.008*** (0.002)	0.007* (0.003)
Income Inequality	−0.126 (0.123)	−0.105 (0.185)
Wave Dummies		
2011	−0.004 (0.005)	−0.016* (0.008)
2012	0.009** (0.003)	0.005 (0.007)
2013	−0.057*** (0.004)	−0.064*** (0.007)
Intercept	1.222 (0.137)***	1.087 (0.234)***
Random intercept		
N	384	384

Notes. (1) Population Density 1: density measured by person/km^2 within the county; Population Density 2: density proxied by county mean of NTL values from DMSP-OLS). (2) Estimations are based on weighted data; robust standard errors adjusted for clustering on counties are shown in parentheses. (3) Reference categories: female, non-CCP membership, single/divorced, unemployed/retied/never work, rural-to-urban migrants, never socializing, year 2010, and Beijing. (4) $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $+p < 0.10$ (two-tailed tests). Bold values indicates the interested coefficients of our explaination variables (Explaination Variable).

spanning from 2010 to 2013, which can help derive the causal relationship between population density and the county's trust level.

In this session, aside from individual-level causal inferences, we further performed the analysis at the county level to see whether the individual logic of the density-trust link holds at the aggregate level. We measured all core explanatory variables and mediators at the county level. To account for the panel autocorrelation, we fit panel-data models using GLS, allowing for AR1 autocorrelation structure. Model results clearly show that from an ecological perspective, density also affects county-level trust (Table 5). To further test the three potential mechanisms at the county level, we present the relevant results in Table 6, demonstrating that county segregation mediates the effect of density on county average trust while socializing and legal cases do not, which replicated our findings at the individual level.

Conclusions and discussion

While population density has long been thought to have pathogenic effects on human health and behavior in cities, few empirical studies have

Table 6. Testing for aggregate mediating effects at county level ($N = 384$).

X = Population density 1	Mediator = ***flight***		Mediator = ***fight***		Mediator = ***friction***	
	Coef.	*p*-Value	Coef.	*p*-Value	Coef.	*p*-Value
Effect of density in reduced model *Total Effect*	−.007	0.025*	−.007	0.025*	**−.007**	**0.025***
Effect of density in full model *Direct Effect*	−.007	0.021*	−.007	0.012*	**−.004**	**0.138**
Mediated Effect *Indirect Effect*	.000	0.764	.000	0.595	**−.002**	**0.043***
X = Population density 2	Mediator = *flight*		Mediator = *fight*		Mediator = *friction*	
	Coef.	*p*-Value	Coef.	*p*-Value	Coef.	*p*-Value
Effect of density in reduced model *Total Effect*	−.008	0.050*	− .0082505	0.050*	**−.008**	**0.050***
Effect of density in full model *Direct Effect*	−.009	0.040*	−.0092512	0.024*	**−.005**	**0.288**
Mediated Effect *Indirect Effect*	.001	0.597	.0010007	0.354	**−.004**	**0.023***

Note. (1) Population Density 1: density measured by person/km^2 within the county; Population Density 2: density proxied by county mean of the NTL values from DMSP-OLS). (2) $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{+}p < 0.10$ (two-tailed tests). (3) Controls as per Model 3 and Model 4 in Table 4. Bold values indicates the interested coefficients of our explaination variables (Explaination Variable).

ever extended "density-pathology" hypothesis to trust. Trust towards general others hinges on social interactions and cooperation, and it reflects the ways in which individuals evaluate the congruency between in-group and out-group members in terms of value and belief, which is particularly important in predicting one's behaviors. If increased density would enhance the probability of negative behaviors, we would expect the effect of density on trust to be just as substantial. In most Western societies, "*fight*" (aggression stimulated by crowding) and "*flight*" (withdrawal from social life to escape) are two major channels through which density took effect by involving direct social interactions with out-group members. However, in a society where generalized trust is derived primarily from interacting with in-group members, "*fight*" and "*flight*" may not work well. In this research, we proposed "*friction,*" the obstacle that prevents minority group from integrating into the majority group, as another link in the potential density-trust relationship in China, a country with a narrow trust radius that has traditionally formed through in-group interactions with family, friends, and colleagues.

In contemporary China, rural-to-urban migration is driving population growth and density. This migratory pattern has formed two primary interest groups in the urban labor market, minority rural migrants and majority urban locals. Due to *hukou* restrictions, people with rural *hukou* were often viewed as inferior. More importantly, the institutionalized *hukou* system has divided the urban labor market into segments (i.e., primary labor market and secondary labor market) further created barriers to prevent rural migrants from working in the primary labor market,

accepting higher paying jobs that offer safer working condition, abundant promotion chances, and various fringe benefits. Unable to bargain with the state-sanctioned rule of segmentation, most of these migrants were crowded into the secondary labor market, holding informal, unstable jobs with low paying, hazardous work conditions, and little benefits. Such *hukou*-based occupational segmentation created "*friction*" for rural migrants to integrate into urban society, producing distrust towards each other between the two groups and therefore lowering their generalized trust. In this way, "*friction*" mediates the detrimental effect of density on trust not only for rural migrants but also for urban locals.

Based on the previously mentioned theoretical framework, we examined the density-trust linkage and the associated mechanisms using four-wave CGSS data from 2010 to 2013. We conducted statistical analysis at both the individual level and county level. The results at both levels showed that density indeed negatively predicts trust of urban residents, and moreover, "*friction,*" or occupational segregation by hukou status, mediates the density-trust relation in China, not "*fight*" or "*flight.*"

Still, this research has some limitation worthy discussion. First, social interaction is a multi-dimensional construct involving more than just socializing with friends and acquaintances (Hawley 2012). In this vein, although "*flight*" mechanism was not supported in this research, we cannot deny that such a result may be ascribed to measurement error. Second, although both micro individual level and macro county level have shown consistent results regarding the effect of density and the potential channels that affect generalized trust, how micro changes evolve to such macro pattern remains unknown. Note that the transformation of micro-level actions and interactions with macro-level outcomes has been an insurmountable challenge to social scientists for years. The loss of information in the process of aggregation is inevitable, increasing the likelihood of the micro-macro inconsistency. However, when the property of interest shows relative independence across individuals (micro-pattern), piecing them together (macro-pattern) might yield consistent results, which could be the first step before probing potential channels through which a micro-pattern can converge into a macro-pattern.

Nevertheless, to our knowledge, this analysis was the first to extend the "density-pathology" hypothesis to trust, an internal motivator of benign or threatening behaviors. We showed that higher density was indeed associated with lower trust, and provided preliminary causal evidence using the IV approach. More importantly, we proposed "*friction,*" an alternative mechanism in explaining the detrimental effect of density. Lastly, "*friction*" is a context-specific measure, which may not exclusively point to labor market segmentation, as it did in our analysis. Rather, it can be extended to a broader inequality measure at a regional or even a country level.

Notes

1. Consider the year 2010 as an example: First, a household weight (HWT) equal to the ratio of the number of adults in the household to the mean number of adults per household (estimated separately for the urban and rural samples) was computed. Second, since in 2010 49.68% of the population of China (1.339 billion) lived in urban areas, a population weight (PWT) was computed for the urban samples. For the urban population, PWT = [1.339 billion*0.4968 /urban sample size]*HWT. Finally, weights were normalized to the original sample size: WEIGHT = PWT/mean (PWT).
2. For detailed description of DMSP-OLS and the data processing methods one can refer to Elvidge et al. (1997). The DMSP-OLS imagery data can be accessed at http://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html
3. The sensor of DMSP is only capable of recording light up to a reported value of 63 (with 0 being no light), leading to a saturation problem (for example, light emitted at central Beijing cannot be distinguished from that at its surrounding area. As of the end of 2011, DMPS started providing the radiance-calibrated data, a conversion from the original data to deal this problem.
4. Note that Chongwen District were merged into Dongcheng District in 2010 July, according to the administrative division adjustment implemented by the Beijing municipality government.
5. In the robustness check we used the individual-level socializing behavior as the mediator, and found that "flight" at individual-level did not account for the density-trust link, just as the county-level socializing variable did. However, we did not test whether individual-level "fight" mediates the effect of density on trust because the CGSS data do not provide with such variable.
6. http://wenshu.court.gov.cn/.
7. "*Friction*" has implicitly revealed the disadvantage of rural hukou holders in the process of job assignment in a segmented labor market. On the one hand, the institutionalized hukou system erects barriers for rural hukou holders attempting to enter the primary labor market and engage in high socio-economic status occupations with better pay and benefits. On the other hand, as urban locals hold most of the elite occupations, to preserve their privilege, they may also set up different job-entry standards to prevent rural hukou holders from entering mainstream occupations. If friction is the primary channel through which the density-trust link affects the urban labor market, one may suspect that rural *hukou* holders would be the most affected group. However, by conducting a multigroup comparison to show whether "friction" channel varies by rural and urban *hukou* holders, we first constrained the constant and coefficients to be equal between urban and rural hukou holders and then relaxed these constraints by allowing constant and coefficients vary by hukou status. The results showed that the model with group-invariant constant and coefficients performs much better compared to the model with group variant constant and coefficient. Hence, friction did not show significant differences between urban and rural *hukou* holders. This could probably be explained by the fact that not only institutionalized job segregation, but also in-group social interactions affect trust. All urban residents, whether migrants or urban locals, are victims of social cleavage and its influence on social trust.

Ethical approval

This paper uses data from second-hand social surveys and has no direct human participants. The datasets are publicly available through the website http://cnsda.ruc.edu.cn. We appreciate suggestions from three anonymous reviewers and have no conflict of interest with others.

Disclosure statement

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

Data available statement

Data and code in this paper is available among request.

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References

Alecu, Andreea. 2021. "Exploring the Role of Network Diversity and Resources in Relationship to Generalized Trust in Norway." *Social Networks* 66:91–9. doi:10.1016/j.socnet.2021.02.002.

Allport, GordonW. 1961. *Pattern and Growth in Personality*. New York: Holt, Rinehart and Winston.

Altman, Irwin. 1975. *The Environment and Social Behavior: Privacy, Personal Space, Territory, Crowding*. Monterey, CA: Brooks-Cole.

Anderson, Sharolyn J., Benjamin T. Tuttle, Rebecca L. Powell, and Paul C. Sutton. 2010. "Characterizing Relationships Between Population Density and Nighttime Imagery for Denver, Colorado: Issues of Scale and Representation." *International Journal of Remote Sensing* 31 (21):5733–46. doi:10.1080/01431161.2010.496798.

Baldassare, Mark. 1978. "Human Spatial Behavior." *Annual Review of Sociology* 4 (1):29–56. doi:10.1146/annurev.so.04.080178.000333.

Barone, Guglielmo, and Sauro Mocetti. 2016. "Inequality and Trust: New Evidence from Panel Data." *Economic Inquiry* 54 (2):794–809. doi:10.1111/ecin.12309.

Baum, Aandrew, and Stuart L. Koman. 1976. "Differential Response to Anticipated Crowding: Psychological Effects of Social and Spatial Density." *Journal of Personality and Social Psychology* 34 (3):526–36. doi:10.1037/0022-3514.34.3.526.

Baum, A., and PaulB. Paulus. 1987. "Crowding." In *Handbook of Environmental Psychology*. Vol. 1, edited by D. Stokols and I. Altman. New York: Wiley.

Baum, A., and S. Valins. 1977. *The Social Psychology of Crowding: Studies of the Effects of Residential Group Size*. Hillsdale, NJ: Erlbaum.

Beasley, Ronald W., and George Antunes. 1974. "The Etiology of Urban Crime: An Ecological Analysis." *Criminology* 11 (4):439–61. doi:10.1111/j.1745-9125.1974.tb00607.x.

Blalock, HubertM. 1964. *Causal Inferences in Nonexperimental Research*. Chapel Hill, NC: University of North Carolina Press.

Booth, Alan. 1976. *Urban Crowding and Its Consequences*. New York: Praeger.

Booth, Alan, and John N. Edwards. 1976. "Crowding and Family Relations." *American Sociological Review* 41 (2):308–21. doi:10.2307/2094476.

Booth, Alan, David R. Johnson, and John N. Edwards. 1980. "In Pursuit of Pathology: The Effect of Human Crowding." *American Sociological Review* 45 (5):873–8. doi:10.2307/2094903.

Booth, John A, and PatriciaB. Richard. 2001. "Civil Society and Political Context in Central America." In *Beyond Tocqueville: Civil Society and the Social Capital Debate in Comparative Perspective*, edited by B. Edwards, M. W. Foley, and M. Diani. Hanover, NH: Tufts University Press.

Braithwaite, V., and M. Levi. 1998. *Trust and Governance*. 1st ed. New York: Russell Sage Foundation.

Calhoun, J. B. 1962. "Population Density and Social Pathology." *Scientific American* 206:139–48. doi:10.1038/scientificamerican0262-139.

Cattell, Raymond B. 1965. *The Scientific Analysis of Personality*. Baltimore: Penguin Books.

Chan, Kam Wing. 2010. "The Household Registration System and Migrant Labor in China: Notes on a Debate." *Population and Development Review* 36 (2):357–64. doi:10.1111/j.1728-4457.2010.00333.x.

Chan, Kam Wing, and Li Zhang. 1999. "The Hukou System and Rural-Urban Migration in China: Processes and Changes." *The China Quarterly* 160:818–55. doi:10.1017/S0305741000001351.

Chen, Yunsong, and Mark Williams. 2016. "Subjective Wellbeing in the New China: Religion, Social Capital, and Social Status." *The British Journal of Sociology* 67 (4):719–46. doi:10.1111/1468-4446.12232.

Chen, Yunsong, and Yi Zhang. 2015. "The Inequality Effect and Social Integration in Urbanization." *Chinese Social Science* 6: 78–95. [in Chinese].

Cheng, Liyu, Yi Zhou, Litao Wang, Shixin Wang, and Cong Du. 2007. "An Estimate of the City Population in China Using DMSP Night-Time Satellite Imagery." *Geoscience and Remote Sensing Symposium* 23–28: 691–4.

Choi, Soobin, and Moosung Lee. 2021. "Diversity as an Opportunity or a Challenge? A Cross-National Study of Ethnic Diversity and Students' Generalized Trust." *International Journal of Educational Development* 80: 102301. doi:10.1016/j.ijedudev.2020.102301.

Choldin, H. M. 1978. "Urban Density and Pathology." *Annual Review of Sociology* 4 (1): 91–113. doi:10.1146/annurev.so.04.080178.000515.

Delhey, J., and K. Newton. 2003. "Who Trusts?: The Origins of Social Trust in Seven Societies." *European Societies* 5 (2): 93–137. doi:10.1080/1461669032000072256.

Delhey, Jan, and Kenneth Newton. 2005. "Predicting Cross-National Levels of General Trust: Global Pattern or Nordic Exceptionalism?" *European Sociological Review* 21 (4):311–27. doi:10.1093/esr/jci022.

Delhey, J., K. Newton, and C. Welzel. 2011. "How General is Trust in "Most People"? Solving the Radius of Trust Problem." *American Sociological Review* 76 (5): 786–807. doi:10.1177/0003122411420817.

Desor, J. 1972. "Toward a Psychological Theory of Crowding." *Journal of Personality and Social Psychology* 21 (1):79–83. doi:10.1037/h0032112.
Doll, C. N. H., and J.-P. Muller. 1999. "An Evaluation of Global Urban Growth via Comparison of DCW and DMSP-OLS Satellite Data." In: *Proceedings of IEEE International Geoscience and Remote Sensing Symposium (IGARSS'99)*. Hamburg, Germany, June 28–July 2, 1134–6.
Edwards, John N., and Alan Booth. 1977. "Crowding and Human Sexual Behavior." *Social Forces* 55 (3):791–808. doi:10.2307/2577471.
Elvidge, C. D., K. E. Baugh, V. R. Hobson, E. A. Kihn, H. W. Kroehl, E. R. Davis, and D. Cocero. 1997. "Satellite Inventory of Human Settlements Using Nocturnal Radiation Emissions: A Contribution for the Global Tool-Chest." *Global Change Biology* 3 (5):387–95. doi:10.1046/j.1365-2486.1997.00115.x.
Erikson, Erik H. 1950. *Childhood and Society*. New York: Norton.
Esser, A. H. 1973. "Experiences of Crowding: Illustration of a Paradigm for Man-Environment Relations." *Representative Research in Social Psychology* 4:207–18.
Evans, Gary W. 1979. "Behavioral and Physiological Consequences of Crowding in Humans." *Journal of Applied Social Psychology* 9 (1):27–46. doi:10.1111/j.1559-1816.1979.tb00793.x.
Evans, G. W., S. J. Lepore, and K. M. Allen. 2000. "Cross-Cultural Differences in Tolerance for Crowding: Fact or Fiction?" *Journal of Personality and Social Psychology* 79 (2):204–10. doi:10.1037//0022-3514.79.2.204.
Fukuyama, Francis. 1995. *Trust. Social Virtues and the Creation of Prosperity*. New York: Free Press.
Galle, Omer R., Walter R. Gove, and J. Miller McPherson. 1972. "Population Density and Pathology: What Are the Relations for Man?" *Science (New York, N.Y.)* 176 (4030):23–30. doi:10.1126/science.176.4030.23.
Gillis, A. R. 1974. "Population Density and Social Pathology: The Case of Building Type, Social Allowance and Juvenile Delinquency." *Social Forces* 53 (2):306–14. doi:10.2307/2576024.
Gove, Walter R., Micheal Hughes, and Omer R. Galle. 1979. "Overcrowding in the Home: An Empirical Investigation of Its Possible Pathological Consequences." *American Sociological Review* 44 (1):59–80. doi:10.2307/2094818.
Gove, Walter R., and Micheal Hughes. 1980. "The Effects of Crowding Found in the Toronto Study: Some Methodological and Empirical Questions." *American Sociological Review* 45 (5):864–70. doi:10.2307/2094901.
Hamamura, Takeshi. 2012. "Social Class Predicts Generalized Trust But Only in Wealthy Societies." *Journal of Cross-Cultural Psychology* 43 (3):498–509. doi: 10.1177/0022022111399649.
Hawley, Zackary B. 2012. "Does Urban Density Promote Social Interactions? Evidence from Instrumental Variable Estimation." *Review of Regional Studies* 42 (3):223–48. doi:10.52324/001c.8101.
Helliwell, John F., and Robert D. Putnam. 2004. "The Social Context of Well-Being." *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* 359 (1449):1435–46. doi:10.1098/rstb.2004.1522.
Henderson, J. V., A. Storeygard, and D. N. Weil. 2012. "Measuring Economic Growth from Outer Space." *The American Economic Review* 102 (2):994–1028. doi:10.1257/aer.102.2.994.
Hooghe, Marc, Tim Reeskens, Dietlind Stolle, and Ann Trappers. 2009. "Ethnic Diversity and Generalized Trust in Europe: A Cross-National Multilevel

Study." *Comparative Political Studies* 42 (2):198–223. doi:10.1177/0010414008325286.
Inglehart, Ronald F. 1997. "Postmaterialist Values and the Erosion of Institutional Authority." In *Why People Don't Trust Government*, edited by Joseph S. Nye, Philil D. Zelikow, and David C. King. Cambridge, MA: Harvard University Press.
Inglehart, Ronald F. 1999. "Trust, Well-Being and Democracy." In *Democracy and Trust*, edited by Mark Warren, 88–120. Cambridge: Cambridge University Press.
Kohler, U., Karlson, K. B., and Holm, A. 2011. "Comparing Coefficients of Nested Nonlinear Probability Models." *The Stata Journal* 11 (3):420–438.
Knack, Stephen, and Philip Keefer. 1997. "Does Social Capital Have an Economic Payoff? A Cross-Country Investigation." *The Quarterly Journal of Economics* 112 (4):1251–88. doi:10.1162/003355300555475.
Knight, John, Lina Song, and Jia Huaibin. 1999. "Chinese Rural Migrants in Urban Enterprises: Three Perspectives." *Journal of Development Studies* 35 (3): 73–104. doi:10.1080/00220389908422574.
Knight, John, and Linda Yueh. 2008. "Segmentation or Competition in China's Urban Labor Market?" *Cambridge Journal of Economics* 33 (1):79–94. doi:10.1093/cje/ben025.
Levy, L., and A. N. Herzog. 1974. "Effects of Population Density and Crowding on Health and Social Adaptation in The Netherlands." *Journal of Health and Social Behavior* 15 (3): 228–40. doi:10.2307/2137023.
Li, Jun, Yanfeng Gu, and Chuncen Zhang. 2015. "Hukou-Based Stratification in Urban China's Segmented Economy." *Chinese Sociological Review* 47 (2): 154–76. doi:10.1080/21620555.2014.990326.
Lo, C. P. 2001. "Modeling the Population of China Using DMSP Operational Linescan System Nighttime Data." *Photogrammetric Engineering & Remote Sensing* 67:1037–47.
Lorenz, Konrad. 1967. *On Aggression*. London: Methuen.
Luhmann, N. 2018. *Trust and Power*. New York: John Wiley & Sons.
Ma, Li 2010. "The Making of the Chinese Working Class: Rural Migrants in Shanghai." The Dissertation thesis. https://ecommons.cornell.edu/bitstream/handle/1813/17648/Ma%2C%20Li.pdf?sequence=1&isAllowed=y.
McBride, G. 1971. "Theories of Animal Spacing: The Role of Flight, Fight and Social Distance." In *Behavior and Environment*, edited A. H. Esser, 53–68. New York: Plenum.
Mellander, C., J. Lobo, K. Stolarick, and Z. Matheson. 2015. "Night-Time Light Data: A Good Proxy Measure for Economic Activity?" *PLOS One* 10 (10): e0139779. doi:10.1371/journal.pone.0139779.
Meng, Xin, and Junsen Zhang. 2001. "The Two-Tier Labor Market in Urban China: Occupational and Wage Differentials Between Residents and Rural Migrants in Shanghai." *Journal of Comparative Economics* 29 (3):485–504. doi:10.1006/jcec.2001.1730.
Misztal, B. A. 1996. *Trust in Modern Societies*. Cambridge: Polity Press
Mood, C. 2010. "Logistic Regression: Why We Cannot Do What We Think We Can Do, and What We Can Do about It." *European Sociological Review* 26 (1): 67–82. doi:10.1093/esr/jcp006.
National Statistical Bureau. 2016. "Main data bulletin of the 2015 National 1% Population Sample Census (in Chinese)." http://www.gov.cn/xinwen/2016-04/20/content_5066201.htm

Newton, Kenneth. 1999. "Social Capital and Democracy in Modern Europe." In *Social Capital and European Democracy*, edited by Jan van Deth, Marco Maraffi, Ken Newton, and Paul Whiteley. London: Routledge.

Newton, Kenneth. 2001. "Trust, Social Capital, Civil Society, and Democracy." *International Political Science Review* 22 (2):201–14. doi:10.1177/019251210122200 4.

Orren, Gary. 1997. "Fall from Grace: The Public's Loss of Faith in Government." In *Why Americans Mistrust Government*, edited by Joseph S. Nye, Philip D. Zelikow and David C. King. Cambridge, MA: Harvard University Press.

Patterson, M. L. 1976. "An Arousal Model of Intimacy." *Psychological Review* 83 (3):235–45. doi:10.1037/0033-295X.83.3.235.

Paxton, Pamela. 2002. "Social Capital and Democracy: An Interdependent Relationship." *American Sociological Review* 67 (2):254–77. doi:10.2307/3088895.

Proshansky, H. M., W. H. Ittelson, and L. G. Rivlin. 1970. "Freedom of Choice and Behavior in a Physical Setting." In *Environmental Psychology: People and Their Physical Settings*, edited by H. M. Proshansky, W. H. Ittelson, and G. Rivlin, 170–81. New York: Holt, Rinehart & Winston.

Putnam, R. 1995. "Tuning in, Tuning out: The Strange Disappearance of Social Capital in America." *PS: Political Science & Politics* 28 (4) :664–83. doi:10.2307/420517.

Putnam, Robert D. 2000. *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon & Schuster.

Regoeczi, W. C. 2002. "The Impact of Density: The Importance of Nonlinearity and Selection on Flight and Fight Responses." *Social Forces* 81 (2): 505–30. doi:10.1353/sof.2003.0018.

Rosenberg, Morris. 1956. "Misanthropy and Political Ideology." *American Sociological Review* 21 (6):690–5. doi:10.2307/2088419.

Rosenberg, Morris. 1957. "Misanthropy and Attitudes Towards International Affairs." *Conflict Resolution* 1 (4):340–5. doi:10.1177/002200275700100403.

Saegert, S. 1973. "Crowding: Cognitive Overload and Behavioral Constraint." In *Environmental Design Research: Vol. 2, Symposia and Workshops. Proceedings of the Fourth International Environmental Design Research Association Conferebce*, edited by W. F. E. Preiser, 254–60. Stroudsburg, PA: Dowden, Hutchinson & Ross.

Schopler, J., and D. Stokols. 1976. *A Psychological Approach to Human Crowding*. Morristown, NJ: Gen. Learn. Press Modular Stud.

Simmel, Georg. 1950. *The Sociology of Georg Simmel*, translated and edited by Kurt Wolff, Glencoe, IL: Free Press.

Simmel, Georg. 2008. "The Stranger." In *The Cultural Geography Reader*, 323–7. Oxford: Routledge.

Stolle, Dietlind, and Marc Hooghe. 2004. "The Roots of Social Capital: Attitudinal and Network Mechanisms in the Relation Between Youth and Adult Indicators of Social Capital." *Acta Politica* 39 (4):422–41. doi:10.1057/palgrave.ap.5500081.

Stokols, Daniel. 1972. "A Social-Psychological Model of Human Crowding Phenomena." *Journal of the American Institute of Planners* 38 (2):72–83. doi:10.1080/01944367208977409.

Stokols, Daniel. 1978. "Environmental Psychology." *Annual Review of Psychology* 29:253–95. doi:10.1146/annurev.ps.29.020178.001345.

Sundstrom, Eric. 1975. "Toward an Interpersonal Model of Crowding." *Sociological Symposium* 14:129–44.
Sutton, Paul C. 2003. "Estimation of Human Population Parameters Using Night-Time Satellite Imagery." In *Remotely Sensed Cities*, edited by V. Mesev, 301–34. London, UK: Taylor & Francis.
Sutton, Paul C., Dar Roberts, Chris Elvidge, and Henk Meij. 1997. " "A Comparison of Nighttime Satellite Imagery and Population Density for the Continental United States." *Photogrammetric Engineering and Remote Sensing* 63 (11):1303–13.
Sztompka, P. 1996. "Trust and Emerging Democracy: Lessons from Poland." *International Sociology* 11 (1): 37–62. doi:10.1177/026858096011001004.
Sztompka, P. 2000. "Trust, Distrust and the Paradox of Democracy." *Polish Political Science YB* 29:5.
Tan, Minghong, Xiubin Li, Shiji Li, Liangjie Xin, Xue Wang, Qian Li, Wei Li, Yuanyuan Li, and Wenli Xiang. 2018. "Modeling Population Density Based on Nighttime Light Images and Land Use Data in China." *Applied Geography* 90: 239–47. doi:10.1016/j.apgeog.2017.12.012.
Uslaner, EricM. 1999. "Democracy and Social Capital." In *Democracy and Trust*, edited by Mark Warren, 121–50. Cambridge: Cambridge University Press.
Uslaner, Eric M. 2000. "Producing and Consuming Trust." *Political Science Quarterly* 115 (4):569–90. doi:10.2307/2657610.
Uslaner, EricM. 2002. *The Moral Foundations of Trust*. New York: Cambridge University Press.
van den Berghe, P. L. 1974. "Bring Beasts Back in: Toward a Biosocial Theory of Aggression." *American Sociological Review* 39 (6):777–88. doi:10.2307/2094152.
van Poppel, Frans, and Lincoln H. Day. 1996. "A Test of Durheim's Theory of Suicide—Without Committing the 'Ecological Fallacy'." *American Sociological Review* 61 (3):500–7. doi:10.2307/2096361.
Wang, Feng, Xuejin Zuo, and Danching Ruan. 2002. "Rural Migrants in Shanghai: Living Under the Shadow of Socialism." *International Migration Review* 36 (2):520–45. doi:10.1111/j.1747-7379.2002.tb00091.x.
Whiteley, Paul F. 1999. "The Origins of Social Capital." In *Social Capital and European Democracy*, edited by J. van Deth, M. Maraffi, K. Newton and P. Whiteley, 25–44. London: Routledge.
Wirth, Louis. 1938. "Urbanism as a Way of Life." *American Journal of Sociology* 44 (1):1–24. doi:10.1086/217913.
Wolfgang, M. E. 1970. "Social Responsibility for Violent Behavior." *Southern California Law Review* 43:5.
Wu, Xiaogang, and Donald J. Treiman. 2004. "The Household Registration System and Social Stratification in China, 1955–1996." *Demography* 41 (2): 363–84. doi:10.1353/dem.2004.0010.
Yamagishi, Toshio, and Midori Yamagishi. 1994. "Trust and Commitment in the United States and Japan." *Motivation and Emotion* 18 (2):129–66. doi:10.1007/BF02249397.
Young, Andrew J, and John T. Reeves. 2002. "Human Adaptation to High Terrestrial Altitude." In *Medical Aspects of Harsh Environments*, edited by K. B. Pandolf and R. E. Burr. Washington: Department of the Army Office of the Surgeon General.

Zhang, Zhuoni, and Xiaogang Wu. 2017. "Occupational Segregation and Earnings Inequality: Rural Migrants and Local Worker in Urban China." *Social Science Research* 61:57–74. doi:10.1016/j.ssresearch.2016.06.020.

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