

SOCIAL DISORGANIZATION, SOCIAL CAPITAL, COLLECTIVE EFFICACY AND THE SPATIAL DISTRIBUTION OF CRIME AND OFFENDERS

An Empirical Test of Six Neighbourhood Models for a Dutch City

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Six different social disorganization models of neighbourhood crime and offender rates were tested using data from multiple sources in the city of The Hague, in the Netherlands. The sources included a community survey among 3,575 residents in 86 neighbourhoods measuring the central concepts of the six models. The data were aggregated to ecologically reliable neighbourhood measures and combined with census data. Crime rates and offender rates were calculated on geo-coded police-recorded data on crimes and apprehended suspects. Spatial regression models were applied to test social disorganization theories in a Western-European city. The findings reveal that social disorganization models do not fit the data well, and indicate that crime rates and offender rates may be caused by distinct urban processes.

Keywords: social disorganization, collective efficacy, crime rates, offender rates

Introduction and Research Question

Although European statisticians started to study the geographic clustering of crimes and offenders from the early 30s of the nineteenth century, US criminologists dominated that field since the 20s of twentieth century (Weisburd *et al.* 2009b). An overwhelming number of empirical studies have been carried out since then in US cities, notably in Chicago. The most influential explanatory model for the unequal distribution of crime and criminals between neighbourhoods originated from US scholars studying the rapid change in their cities and is known as social disorganization theory. This theoretical framework is still leading in international urban criminology. However, the various versions of social disorganization theory have not been empirically tested extensively in other parts in the world (exceptions are Eisner and Wikström 1999; Mazerolle *et al.* 2010; Pauwels *et al.* 2010; Sampson and Groves 1989; Sampson and Wikström 2008b; Steenbeek and Hipp 2011; Wikström 1991; Wikström and Dolmén 2001). In the present study, we investigate the relevance of six distinct versions of social disorganization theory by simultaneously testing them using data on 86 small neighbourhoods in a Dutch city.

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We first discuss briefly the origins and development of social disorganization theory as a framework, including the most recent refinement, collective efficacy theory. Then, based on a literature review, different propositions were identified representing six separate and testable models of social disorganization using aggregate data from a community survey in 2009 in the city of The Hague together with additional census and geo-coded police data of crime rates and offender rates.

Social Disorganization Theories

The concept of social disorganization originates from William Thomas (1966 [1927]) when he studied social change in society:

... a decrease of the influence of existing social rules of behavior upon individual members of the group. This decrease may present innumerable degrees, ranging from a single break of some particular rule by one individual up to a general decay of all the institutions of the group. (Thomas 1966 [1927]: 3)

With this concept embedded in a broader theory of social change, he tried to indicate the weakening of the influence of institutions on the behaviour of neighbourhood residents, especially among immigrants who lost their traditional roots when settled in large numbers in fast growing American cities. The concept referred primarily to the lesser-functioning institutions and secondarily to human beings. The focus was on the negative effects of rapid changes in the population composition of American cities in those days. Scholars were interested in the question of how to explain the (problematic) behaviour of individuals in interaction with these changes at a macro level in societies. The best setting to study the detrimental effects of ongoing social change was the metropolitan context of cities like Chicago that rapidly grew from a small settlement into a metropolis in just a few decades.

Social disorganization as a neighbourhood characteristic would become leading for all later Chicago sociologists studying crime and other social problems as the ultimate consequence of rapid urban growth and immigrant concentrations. Park and especially Burgess connected social disorganization a few years later with the ecological perspective of zones in the city of Chicago (Burgess 1967 [1925]; Park and Burgess 1967 [1925]). That perspective inspired subsequent research of Shaw and McKay (1969 [1942]; Shaw *et al.* 1929). Shaw and his assistants stated that:

Under the pressure of the disintegrative forces which act when business and industry invade a community, the community thus invaded ceases to function as a means of social control. Traditional norms and standards of the conventional community weaken and disappear. Resistance on the part of the community to delinquent and criminal behavior is low, and such behavior is tolerated and may become accepted and approved. (Shaw *et al.* 1929: 204)

They argued that social disorganization is the outcome of three structural area characteristics: low socio-economic status, high residential mobility and ethnic heterogeneity. These structural characteristics would weaken the resistance of residents towards unconventional behavioural norms. The weakening of traditional institutions was said to be responsible for the emergence of competing value systems in neighbourhoods: unconventional behavioural norms 'invaded' disorganized communities and

challenged conventional moral values. Moreover, it was assumed that, in (ethnically) heterogeneous communities, institutional participation was lower and informal control was obstructed because inhabitants of such areas could not effectively communicate with each other. Residential mobility had detrimental effects on the balance of a community because inhabitants did not reside long enough in disorganized areas to develop informal control and a system of shared values.

Shaw and McKay's innovative empirical study of the city of Chicago inspired many other researchers to study the spatial distribution of crime in other American cities (Boggs 1965; Burgess and Bogue 1964; Chilton 1964; Lander 1954; Reckless 1940; Sutherland 1937; Sweetser 1970).

In the 60s and 70s, the social disorganization paradigm was left because of methodological problems in geographic criminology and the statistical critique of Robinson (1950), who demonstrated the presence of ecological fallacy in much urban research (Bursik 1988; Weisburd *et al.* 2009b). The increasing popularity of the survey and self-report as new methods in criminology further added to the decay of the ecological approach.

At the end of the 70s, Kornhauser examined in her Ph.D. thesis several interpretations of the concept of social disorganization by elaborating the underlying assumptions that have emerged from research (Kornhauser 1978). She concluded that social disorganization models are assumed to be valid outside the United States:

Implied in social disorganization theory is the use of all three models to explicate the bases of social order of all societies. In distinguishing culture from social structure, social disorganization theory is equipped to examine the effects of each separately. (Kornhauser 1978: 45, italics in original)

The revival of neighbourhood studies

In the 80s, social disorganization and the study of the role of communities in individual crime (contextual analyses) and crime distributions (aggregate level of analyses) returned on the research agenda. Especially the Crime and Justice volume *Communities and Crime* (Reiss and Tonry 1986) contributed by bringing together a new generation of academics with a renewed interest in (Chicago) community research, not just by mimicking the insights of Shaw and McKay, but by posing new research questions. Since then, a revival of disorganization studies emerged in the United States, extending classic disorganization perspectives with other structural indicators and intervening processes like social cohesion, informal control, social trust, social ties, social capital and collective efficacy. Bursik (1984; Bursik and Webb 1982) challenged the notion of stable crime rates in neighbourhoods caused by stable structural factors. Neighbourhoods can have criminal careers as well (Bursik and Grasmick 1993; see also Groff *et al.* 2010; Weisburd *et al.* 2009b).

Elaboration of the classic model

Sampson added in one of his earlier publications 'family disruption' to Shaw and McKay's perspective on social disorganization (Sampson 1987). He stated that single parents are less able to supervise and to control their offspring in public spaces because they have to run the family as well as taking care of having an income. A few

years later, Sampson and Groves (1989) added additional indicators of social disorganization: urbanization (population density) and structural density. Structural density mostly refers to an area's concentration of high-rise flats (social housing) but also to the clustering of children in the same household unit. Additionally, structural density is assumed to reduce area supervision and collective problem-solving behaviour. More importantly, Sampson and Groves introduced mediating mechanisms like local friendship networks, low organizational participation and unsupervised teenage peer groups to get more empirical insight into the intervening processes that Shaw and McKay left untested (Sampson and Groves 1989). Sampson and Groves found empirical evidence for the intermediate role of these three concepts, but later studies only found partial support (Lowenkamp *et al.* 2003; Sun *et al.* 2004; Veysey and Messner 1999).

From Coleman's social capital to collective efficacy

In the 80s, pioneering publications of sociologists and political scientists on social capital became popular. Notably Bourdieu, Coleman and Putnam inspired urban research by supplying an explanatory framework for the relation between social capital and the presence of social problems (Bourdieu 1986; Coleman 1988; 1990; Granovetter 1973; Putnam 1995; 2001). They emphasized the importance of social ties as sources of human capital for individuals, and for communities that are made up of individuals. Social capital theory rejects the assumption that social cohesion can only be achieved in communities characterized by *strong* networks. Social capital theory acknowledges that *weak social ties* may prevail over strong social ties and that social ties do not necessarily need to have a local character (Granovetter 1973). Putnam defines social capital as connections among individuals that facilitate coordination and cooperation for mutual benefit (Putnam 1995). A community's *social capital* will increase as *trust, reciprocity* and *formal networks between residents* (civic engagement or organizational participation) are embedded more deeply into the social relationships of a community (Lederman *et al.* 2002). Various studies showed that communities with a high level of respect and trust (i.e. a high level of social capital) are less affected by crime (Rice and Sumberg 1997). According to this view, social capital is a community characteristic that is seen as a collective good. Social capital at the macro level refers to *shared norms and values* that are beneficial for a community, while social capital at the micro level refers to *social relationships* that are beneficial for the individual.

The most influential contemporary theory for the study of the distribution of crime is the *Collective Efficacy Theory* of Sampson (and his colleagues), which is built on the theory of social capital (Sampson 2010; Sampson *et al.* 1997; 1999). Collective efficacy theory stresses the importance of a community being able to solve its commonly identified problems, such as crime and safety. Collective efficacy is defined by Sampson as 'the process of activating or converting social ties among neighborhood residents in order to achieve collective goals, such as public order or the control of crime' (Sampson 2010: 802). The theory aims to explain the non-random distribution of crime across urban spaces and why neighbourhood characteristics such as poverty and residential mobility are positively related to crime. It elaborated mainly the social capital theory and empirically developed measures to tap components of social cohesion such as trust, reciprocity and generational change (Sampson 1986). The introduction of this concept creates the

theoretical and empirical link between ‘social trust’ on the one hand and ‘informal social control’ on the other. Social and mutual trust in a community is an essential condition for fostering informal social control in the community, and thus the willingness to intervene for the common good. Therefore, communities characterized by a strong collective efficacy are resistant to high local concentrations of crime, victimization and fear of crime. Collective efficacy can be seen as the ‘local social eyes’ in the community, an important self-regulating mechanism in the community, and consists of collective supervision of the behaviour of children and adolescents and intergenerational closure, the ties between different generations (for children and adults that live in the same area) (Sampson 2002; 2012; Sampson *et al.* 1997). To test this theory, Sampson and colleagues limited the number of structural characteristics to an index reflecting concentrated disadvantage, immigrant concentration, residential stability and family disruption.

Testable Propositions of Disorganization Theories and the Distribution of Offender and Crime Rates across Neighbourhoods

In the present study, we aim to replicate empirical tests of six versions of social disorganization theory on data of a Dutch city. We are aware of the fact that the six versions were developed over the course of a century; they reflect not only major social issues of their times, but are also limited by the available data and statistical techniques of the era in which they were formulated. Because neither the original nor the contemporary versions of social disorganization theory have extensively been tested outside the United States, we do not consider it an anachronism to evaluate multiple versions from different eras alongside each other. In order to carry out these tests, the six versions must be translated into empirically testable models. Summarizing the literature, we distinguish the following (for an overview, see Table 1).

Classic disorganization model

In this classic model of the 1920s, the proposition to be tested is ‘the higher the residential mobility, the lower the SES and the higher the ethnic heterogeneity, the higher the crime rate and the offender rate in that neighbourhood’.

The Shaw and McKay model of social disorganization

In this model, the proposition ‘the lower the SES, the higher the residential mobility, the higher the ethnic heterogeneity, and the less homogeneous the value system of a neighbourhood, the higher the offender rate in that neighbourhood’ is tested. Shaw and McKay’s model is originally aimed at explaining offender rates,¹ but we also test this model for explaining the crime rates across neighbourhoods, assuming provisionally that similar causal mechanisms are producing variations in crime and offender rates.

¹ Shaw and McKay used the home addresses of juvenile offenders to explore delinquency variations across neighbourhoods. It was assumed that most juvenile offenders perpetrated offences in the local neighbourhood. The difference between offender rates and crime rates was not addressed.

TABLE 1 *Six social disorganization models to be tested*

Models	Classic model	Shaw and McKay	Sampson 1987	Sampson and Groves 1989	Social capital	Collective efficacy
<i>Concepts</i>						
SES	X	X	X	X	X	
Ethnic heterogeneity	X	X	X	X	X	
Residential mobility	X	X	X	X	X	
Concentrated disadvantage						X
Immigrant concentration						X
Residential stability				X		X
Heterogeneous tolerant value system		X				
Family disruption			X	X		X
Urbanization				X		
Structural density				X		
Local friendship networks				X	X	
Organizational participation				X	X	
Unsupervised peer groups				X	X	
Neighbourhood trust					X	
Collective efficacy						X

Sampson's extended classic social disorganization model of 1987

In this model, it can be expected that 'the higher the residential mobility, the lower the SES, the higher the ethnic heterogeneity, and the higher the proportion of single households, the higher the offender rate in that neighbourhood'. Sampson's model focused on (violent) offender rates, but we also test his model on the general crime rate.

Sampson and Groves's model of social disorganization

For this model, we test the proposition that 'the higher the residential mobility, the lower the SES, the higher the ethnic heterogeneity, the higher the population density, the higher the level of urbanization, the less stable residential mobility, the more family disruption, the less developed local friendship networks, the lower the organizational participation and the more unsupervised teenage peer groups, the higher the crime rate in the neighbourhood'. Sampson and Groves tested their model on self-reported offending, crime rates and victimization rates in England and Wales. It can also be tested on offender rates. The provisional assumption is that common causes produce variations in crime and offender rates.

Social capital model of social disorganization (based on Putnam, Coleman and Bourdieu)

In this model, we can expect that 'the higher the residential mobility, the lower the SES, the higher the ethnic heterogeneity, the less neighbourhood trust, the less local friendship networks and the less participation of residents in organizations to solve

neighbourhood problems, the higher the crime rate and the offender rate in that neighbourhood’.

Sampson’s model of collective efficacy

In this model, it is assumed that the influence of structural characteristics of a neighbourhood is mediated by the collective capacity to efficacy to explain the distribution of crime rates across neighbourhoods: ‘the higher the concentrated disadvantage, the immigration concentration, residential stability and family disruption, and the less collective efficacy, the higher the offender and crime rates in that neighbourhood.’ We further test this model on the offender rate assuming provisionally that the causal mechanisms are similar for the rates of crime and offenders in neighbourhoods.

Methods and Data Collection

The study is based on (1) data of a *community survey* among residents in the city area of The Hague in 2009, (2) *additional census data* of the local government (mostly of 2008) and (3) *police data* containing geo-codes of all recorded offences committed in 2009 and of the home addresses of all arrested suspects in the city in 2009. The city of The Hague is the third largest city of the Netherlands and is situated near the coast of the North Sea. It is the residence of the government and had in 2009 468,000 inhabitants. The Hague can be labelled as multicultural with large minority groups (especially Moroccan and Turkish) and with hundreds of other nationalities. Forty-nine per cent of the population of The Hague has now a non-Dutch origin (of which 73,000 are Western and 168,000 non-Westerners).

The *community survey* was conducted in the city of The Hague and its suburbs in 2009 in 110 neighbourhoods. The neighbourhoods of The Hague are not merely administrative aggregates, but have ecological validity: their names and boundaries date back many decades or more and have practical and social significance to the residents. (For more information about Dutch cities, see Bruinsma 2007.) We excluded 24 neighbourhoods from the analyses because the census data of these were not comparable enough with the others² or have fewer than 20 respondents. The remaining 86 neighbourhoods cover the city of The Hague and contain an average of 4,000–5,000 residents. The neighbourhoods needed to contain enough respondents to provide valid information about its social ecological characteristics. This implicated that parks and industrial areas with few residents were excluded from the survey. The number of residents in a neighbourhood that received a community questionnaire was adjusted to the proportion of ethnic minorities, because past research showed that, in general, ethnic minorities responded less to surveys than others did. The collection of data was organized in three batches (in March, May and November 2009). In total, 11,505 questionnaires were sent out to residents; 3,696 questionnaires were returned, of which 3,545 remained useful for analysis (after deleting returned questionnaires with item response

² The other neighbourhoods are from former municipalities that recently merged with the city of The Hague. These municipalities used different measures in their census data.

tendencies or large numbers of missing values). The net-response rate is 31 per cent, with an average of 36 respondents per neighbourhood.

The questionnaire of the survey closely followed the questionnaire of the PADS+ community survey of Peterborough (Wikström and Butterworth 2006; Wikström *et al.* 2012). Some items were adjusted to the Dutch situation and the questionnaire was extended with a few additional questions. Similarly to the PADS+ study, respondents were asked to think of their 'neighbourhood' as an area within about five minutes' walking distance from their home.

The *additional census data* on structural characteristics of neighbourhoods are publicly available. They were collected from municipal databases on the web (e.g. www.denhaag.buurtmonitor.nl). In order to avoid time order problems, census data of the year 2008 were used.

The *police data* were provided by the regional unit The Hague of the Dutch National Police (covering the greater area of The Hague). They contain both offences and offenders. The offence data are the geo-coded locations of all police-recorded crimes in the year 2009 (including property and violent crimes or drug offences and excluding traffic offences). The offender data consist of the home addresses of all suspects of crimes that were arrested in 2009 by the police and whose file has been sent to the public prosecutor. In the Netherlands, these kind of suspects are officially charged for having committed a crime, and are dealt with by the public prosecutor (fines, community service) or brought to court.

Measurement of the Concepts

Dependent variables

The dependent variable *crime rates* is based on the registered number of *offences* per neighbourhood that have been committed in 2009 in the area of The Hague both as reported by victims and bystanders and as detected by the police (N = 40,143). The average number of offences in the neighbourhoods is 9.93 per 100 residents, with a minimum of 2.29 and a maximum of 58.98 (SD = 7.43). The dependent variable *offender rates* is based on the number of *suspects* living in a neighbourhood in that year. These are straightforward counts, drawn from the police data (N = 9,770) with an average of 2.03 for each 100 residents per neighbourhood (minimum = 0.25; maximum = 7.43; SD = 1.12). These suspects have been sent to the public prosecutor's office to deal with their cases. All police data are geo-coded with the exact location (based on the six-digit postal code) where the crime has occurred or where the offender lives. Based on a map, we grouped these geo-codes into their corresponding neighbourhood. Both variables have been standardized for each 100 residents in a neighbourhood.

Independent variables

The *SES* is a composite score based on factor analysis, containing the following four standardized measures: (1) residential property value: the average estimated value of residential properties (both public housing and private ownership property) in the neighbourhood in 2008; (2) unemployment rate: the unemployment rate of neighbourhood residents on 1 January 2008; (3) low income: the percentage of the neighbourhood

households that in 2008 had an income below the lowest quintile of the income distribution in the Netherlands; and (4) the percentage of the neighbourhood households that received welfare benefits in 2006. *Neighbourhood mobility* was measured by the number of residents that moved into the neighbourhood in 2008 plus the number of residents that moved out of the neighbourhood in 2008, divided by the number of residents living in the neighbourhood at 1 January 2008. The *ethnic heterogeneity* of the neighbourhood is measured by the Blau/Herfindahl index, in formulae where N, M, T, S and A are numbers of residents from Dutch, Moroccan, Turkish, Surinamese and Antillean origin (definition of Statistics Netherlands, based on own birth country and/or parents birth countries) in the neighbourhood, and O is the number of residents from other origins than those mentioned in the neighbourhood. The index represents the likelihood that two random residents from the neighbourhood have a different ethnic origin.

Family disruption was indicated by the percentage of the neighbourhood households that were single-parent families on 31 December 2008. *Population density* is the number of residents per square kilometre in the neighbourhood. *Residential stability* is the percentage that has lived in the neighbourhood for at least five years on 31 December 2008. *Structural density* is indicated by the percentage of residential properties in high-rise buildings (apartments). *Immigrant concentration* is the percentage of the population of non-native Dutch ethnic origin as defined by Bureau Statistics Netherlands on 31 December 2008.

Concentrated disadvantage is a composite score based on factor analysis, containing five standardized measures: (1) family disruption (as above); (2) immigrant concentration; (3) low income: the percentage of households that had in 2008 an income below the lowest quintile of the income distribution in the Netherlands; (4) welfare: the percentage of neighbourhood households that received welfare benefits in 2006; and (5) number of adolescents: the percentage of the population in the age group of 15–24 on 31 December 2008.

The remaining independent variables were measured by combining items from the neighbourhood survey. To make comparisons possible, we used measurement scales and census data as close as possible to the original measurements. With these items, we constructed additive (one-dimensional) Likert-type scales representing the theoretical concepts. Theoretical considerations as well as factor analyses (forced one-factor solutions in an exploratory principal axis factor analysis) and reliability analyses were used to decide about the composition of the scales. We also compute by the multilevel program HLM6 an ecological reliability measure, lambda, for each scale (Raudenbush *et al.* 2004; Raudenbush and Sampson 1999). This measure indicates the extent to which the answers of the respondents are really clustered in the ecological units of our study: the neighbourhoods.³ Raudenbush and Sampson (1999) earlier suggested that 20–30 respondents is sufficient to reliably measure neighbourhood social characteristics. The measures were aggregated after a check of the ecological reliability in empty two-level

³ The λ parameter can be interpreted as the ecological counterpart of Cronbach's alpha. λ 's above 0.80 are regarded as indicators of good ecological reliability. However, λ depends on the number of respondents, and slightly lower estimates may be regarded as satisfactory when the number of respondents per ecological unit is relatively low, as is the case in our study. Most of the scale items have five response categories, ranging from totally agree to totally disagree. We employed statistical imputation (using the Expectation Maximization (EM) technique) to minimize loss of information when performing multivariate analyses (Dempster, Laird and Rubin 1977). The reliability coefficients we provide (α and λ) are based on the imputed items.

random intercept models and two-level random intercept models that controlled for demographic background characteristics.

Collective efficacy was measured by summing two scales from the neighbourhood survey: one measuring *social trust* among the neighbours and one measuring *informal control* by neighbours (their intention and capacity to intervene). *Social trust* was captured by five items with five response categories. The items are 'Neighbours are willing to help other neighbours', 'It is a tightly knit neighbourhood', 'The neighbours can be trusted', 'People can get along with each other very well in the neighbourhood' and 'People in the neighbourhood have very distinct norms and values'. Alpha of the social trust scale is 0.796 and lambda is 0.890. *Informal control (collective action)* was measured by six items with five response categories. The scale consists of the following questions: 'If a group of kids is skipping school and hanging around in the street, would your neighbours do something about it?', 'If kids were spraying graffiti on a building in your street, would your neighbours do something about it?', 'If a fight is going on before your house and someone is beaten or threatened, would your neighbours do something about it?', 'Suppose you are on holiday and your window would be smashed, would your close neighbours let it repaired when you were still away?', 'If a young kid is behaving without respect to an adult, would your neighbours do something about it?' and 'Suppose your community centre⁴ will be closed, would your neighbours organise something to keep it open?'. Alpha is 0.79 and lambda is 0.77 for this scale.

The concept of *unsupervised peer groups* is measured by the sum of two standardized questions: an item of disorder 'Is there in your neighbourhood a problem with ... kids hanging around on the streets without supervision?' and an item of negative events 'When did you see for the last time in your neighbourhood ... a group kids of kids without supervision?'. The alpha for this 'scale' is 0.74 (the correlation between the items is 0.59) and lambda is 0.85.

Local friendship network is a scale consisting of the answers on three items: 'Do you have good friends living in your neighbourhood?', 'Are there neighbours that you provide small services, and they provide you small services (like lending things to each other)?' and 'Are their neighbours with whom you do activities together at least once a week?'. The alpha for this scale is 0.51 and lambda is 0.63.

Neighbourhood participation is a scale of three items measuring the respondents' own participation in the neighbourhood. The items are: 'I am really interested in what is going on in my neighbourhood', 'I often talk with neighbours about what is going on in the neighbourhood' and 'I am actively involved in organizations and social groups that take care of neighbourhood affairs'. Alpha is 0.73 and lambda is 0.49 for this scale. The latter indicates a relatively low ecological reliability, implying that results with regard to this measure should be interpreted with caution.

The heterogeneity of the value system of the neighbourhood is based on the respondent's own tolerance towards rule-breaking behaviour. That is an additive index of the respondents' evaluation of 11 situations of potential wrongdoing. Respondents were asked to indicate how wrong it is to 'Ride through red traffic lights', 'Skate board on places where it is forbidden', 'Litter', 'Make scratches on cars', 'Drive 10 km faster on a highway than the maximum speed', 'Steal a CD in a store', 'Be drunk in public spaces', 'Hit or kick

⁴ In the original scale for collective efficacy, Sampson used 'closing a fire station in your neighbourhood' but, because Dutch fire departments are centrally organized, we replaced fire station by community centre.

someone who made an impolite comment', 'Keep too much change of €2 in a store', '(Try to) break and enter into a building to steal something' and 'Park your car somewhere unauthorized'. Alpha is 0.78 and lambda is 0.58. In order to measure the heterogeneity of values, we used the standard deviation of the neighbourhood mean.

Analytical Strategy

As the present study aims to test relationships between neighbourhood characteristics, neighbourhoods are the units of analyses. We opted for the smallest areas for which the relevant data were available, not for very large areas because these may hide underlying variations (Oberwittler and Wikström 2009; Weisburd *et al.* 2009a). These smallest possible neighbourhoods have an average residential population of 4,000–5,000. Because the units of analysis are contiguous neighbourhoods, unmeasured heterogeneity may produce spatially autocorrelated error terms, thereby violating an assumption of the Ordinary Least Squares (OLS) linear regression model. The presence of spatially autocorrelated error terms is suggested by the fact that both dependent variables in the analyses—the neighbourhood crime rate and the neighbourhood offender rate—are spatially clustered. Based on a queens adjacency weight matrix (see below), the Moran's I statistic was calculated (Moran 1950) for both variables. This statistic signals spatial autocorrelation, and ranges between -1 (negative spatial autocorrelation) and $+1$ (positive spatial autocorrelation). Its value equalled 0.21 ($p < 0.01$) for the crime rate and 0.38 ($p < 0.001$) for the offender rate, indicating that both the crime rate and the offender rate cluster spatially.

A spatial error regression model (Anselin 1988; 2003) is able to capture autocorrelated error terms and produce unbiased estimates and standard errors (for recent applications to neighbourhood crime rates, see Andresen 2006; Deane *et al.* 2008). In the spatial error model, spatially autocorrelated error is an explicit element of the regression model:

$$y = X\beta + \lambda W\varepsilon + u.$$

In this regression equation, y is the dependent variable, $X\beta$ is a matrix representing the independent variables X and their associated parameters β , ε is a vector of spatially autocorrelated error terms, W is a weight matrix that specifies the spatial relations between all observations in the analysis, λ is a single parameter that measures the amount of spatial interaction and u is a regular (non-autocorrelated) error term. Thus, in the spatial error model, the error term is split into an autocorrelated part $\lambda W\varepsilon$ and a non-autocorrelated part u . This is an appropriate model if it can be assumed that there are unobserved independent variables that are spatially autocorrelated and that affect the value of y . In this sense, the model captures the spatial influence of unobserved (unmeasured) independent variables if it exists.

We used a binary weight matrix W based on adjacency between neighbourhoods according to a queens criterion (two neighbourhoods are adjacent if their borders touch each other in at least a single point). The models were implemented using the 'spdep' package in the R statistical software system (R Development Core Team 2008).

To avoid time ordering problems in the models, data of all structural characteristics of the neighbourhoods were collected from the year 2008 whereas the police-recorded crime rates and offender rates are from 2009.

Multicollinearity diagnostic tests were also performed on each model in the regression analyses, by calculating variance inflation factors (VIF) (Belsley 1991). None of the VIF has reached a value above five, indicating that no model is characterized by degrading multicollinearity.

Findings

In 2009, the Haaglanden police registered 40,143 crimes and arrested 9,770 suspects that were subsequently prosecuted. Inspection of the correlation matrix (see the Appendix) reveals that there is no significant relation between the two dependent variables (0.04^{ns}). This is a remarkable result because one would expect at least some substantive positive relationship (Shaw and McKay 1969 [1942]). Offenders in general have a short journey to crime from their homes (Rengert 2004). Further, we can see that crime rates have only a few significant relations with the independent variables while offender rates show higher associations. The correlation matrix also demonstrates that the census variables representing the structural characteristics of neighbourhoods correlate highly as could be expected, indicating that they all tap dimensions of the composition of neighbourhoods (but used separately in the theoretical models). Trust and collective efficacy correlate highly with all variables representing other intermediating processes in neighbourhoods.

Let us first assess how well the six social disorganization models explain *offender* rates in The Hague. In general, the findings are mixed for all models. As can be seen in Table 2, the classic model is only partly confirmed by the data. The strongest impact on offender rates comes from the SES (-0.72), followed by the residential mobility (-0.29). The direction of the coefficients is as predicted by classic disorganization theory: the lower the SES of a neighbourhood and the higher the residential mobility, the higher the number of offenders living in that neighbourhood. The effect of the ethnic composition of the neighbourhood contradicts theory and does not add significantly to the variation in offender rates (-0.11).

The Shaw and McKay model does not perform better in our test. A heterogeneous value system of a neighbourhood does not contribute to the explanation of offender rates (-0.01). In addition, the introduction of the value system in the equation does not change the estimates of the effects of the structural variables on offender rates (compared to the classic model).

The third model, Sampson's extension of the classic model, is mostly confirmed. The number of single-headed families in neighbourhoods contributes significantly but moderately to the variation in offender rates (0.29) and in the predicted direction, implying that the more one-headed families, the more offenders live in that neighbourhood. In this model of Sampson, the impact of SES decreased in strength (-0.55) and the impact of residential mobility on offender rates increased, indicating that family disruption partly mediates the effects of structural characteristics of neighbourhoods on offender rates. Both findings are in accordance with the theory. Although originally not developed to explain the distribution of offenders, this version of the theory is mostly capable of doing so.

The test of Sampson and Groves's model demonstrates that the structural characteristics of the previously discussed models maintain the size of their impact on the number of offenders. The newly introduced population density (-0.25), urbanization

TABLE 2 *Spatial Simultaneous Autoregressive (SAR) error models of offender rates of neighbourhoods for six social disorganization models (N = 86)*

Offender rates	I: Classic model	II: Shaw and McKay	III: Sampson 1987	IV: Sampson and Groves	V: Social capital	VI: Collective efficacy
SES	-0.72***	-0.73***	-0.53***	-0.73***	-0.64***	
Ethnic heterogeneity	-0.11 ^{ns}	-0.11 ^{ns}	-0.22 ^{ns}	-0.08 ^{ns}	-0.17 ^{ns}	
Residential mobility	0.29**	0.29**	0.41***	0.39***	0.30***	
Concentrated disadvantage						0.66***
Immigrant concentration						-0.12 ^{ns}
Residential stability				0.12 ^{ns}		-0.19*
Heterogeneous tolerant value system		-0.01 ^{ns}				
Family disruption			0.32***	0.08 ^{ns}		0.23 ^{ns}
Population density				-0.22**		
Urbanization				-0.29***		
Structural density				-0.20*		
Local friendship networks				-0.14 ^{ns}	0.05 ^{ns}	
Organizational participation				-0.09 ^{ns}	0.00 ^{ns}	
Unsupervised peer groups				0.18 ^{ns}		
Neighbourhood trust					-0.19 ^{ns}	
Collective efficacy						0.03 ^{ns}
Lambda	0.08 ^{ns}	0.08 ^{ns}	-0.16 ^{ns}	-0.18 ^{ns}	-0.00 ^{ns}	-0.05 ^{ns}

*** p < 0.001; ** p < 0.01; * p < 0.05.

(-0.30) and structural density (-0.23) add significantly to the variation in offender rates. The direction of the coefficients is, however, in conflict with theory. Our findings indicate that the higher the level of urbanization, the higher the level of structural density, and the higher the population density, the lower the offender rates in a neighbourhood. The assumed mediating variables show no substantial relationships with offender rates. Local friendship network, organizational participation and the presence of unsupervised peer groups seems to have no importance for the explanation of offender rates. Even the impact of single-headed families disappears (compared to Sampson's 1987 model).

The social capital model cannot stand our test either. None of the predicted effects of the mediating variables 'local friendship networks', 'organizational participation' and 'neighbourhood trust' was found. Besides SES and residential mobility, all other theoretical specified effects on offender rates are statistically insignificant.

Our test of the collective efficacy model of Sampson and his colleagues also results in an inadequacy of explaining offender rates. We observe that the structural variable 'concentrated disadvantage' takes over the role of SES of the other models as the strongest predictor. Residential stability has a significant effect on offenders' rates, but the direction is opposite to the theoretical expectation (-0.19). There is no significant relation between collective efficacy and offender rates (0.03).

All estimates of the spatial error parameter λ are non-significant, indicating that there is no significant spatial autocorrelation.

We further tested the social disorganization models on the neighbourhood *crime rates* (Table 3). Again, all estimates of the spatial error parameter λ are non-significant, indicating that there is no significant spatial autocorrelation. It can be observed that only one of the specified relations of the classic model is statistically significant. SES and residential mobility do not contribute to the variation in crime rates in neighbourhoods. Only the variable ethnic heterogeneity contributes significantly to the variation of crime rates (0.41). The higher the level of ethnic heterogeneity, the higher the crime rate in a neighbourhood.

A similar finding resulted from our test of the Shaw and McKay's model. The heterogeneity in the value system of a neighbourhood does not have a significant relation with crime rates (-0.03). There are no changes in the coefficients of SES and residential mobility with crime rates.

In the test of Sampson's extension of the classic model, SES and residential mobility have no impact on crime rates, but ethnic heterogeneity maintained its positive effect (0.48). In addition, family disruption has a positive effect (-0.46): the more single-headed families in a neighbourhood, the higher its crime rate.

Regarding the findings of our test of Sampson and Groves's model, it can be observed that, of the structural characteristics of neighbourhoods, only ethnic heterogeneity (0.53) and population density (0.34) have a significant effect on crime rates. Family disruption (-0.34), local friendship networks (-0.17) and unsupervised youth groups in the neighbourhood (0.20) have no significant relationship with crime rates. Of the

TABLE 3 *Spatial Simultaneous Autoregressive (SAR) error models of crime rates of neighbourhoods for six social disorganization models (N = 86)*

Crime rates	I: Classic model	II: Shaw and McKay	III: Sampson 1987	IV: Sampson and Groves	V: Social capital	VI: Collective efficacy
SES	0.24 ^{ns}	0.22 ^{ns}	-0.07 ^{ns}	-0.01 ^{ns}	0.18 ^{ns}	
Ethnic heterogeneity	0.41*	0.41*	0.48**	0.53***	0.46**	
Residential mobility	0.10 ^{ns}	0.10 ^{ns}	-0.01 ^{ns}	-0.00 ^{ns}	0.15 ^{ns}	
Concentrated disadvantage						0.34*
Immigrant concentration						0.40**
Residential stability				0.05 ^{ns}		-0.06 ^{ns}
Heterogeneous tolerant value system		-0.03 ^{ns}				
Family disruption			-0.46**	-0.34 ^{ns}		-0.63***
Population density				-0.34*		
Urbanization				0.06 ^{ns}		
Structural density				0.03 ^{ns}		
Local friendship networks				-0.17 ^{ns}	-0.32*	
Organizational participation				-0.27*	-0.37**	
Unsupervised peer groups				0.20 ^{ns}		
Neighbourhood trust					0.17 ^{ns}	
Collective efficacy						0.07 ^{ns}
Lambda	0.26 ^{ns}	0.26 ^{ns}	0.10 ^{ns}	0.25 ^{ns}	0.16 ^{ns}	-0.05 ^{ns}

*** p < 0.001; ** p < 0.01; * p < 0.05.

mediating variables, only organizational participation contributes significantly to the variation in crime rates (0.27): the higher the organizational participation in the neighbourhood, the lower the crime rate.

The social capital model partly survives our empirical test because local friendship networks (-0.32) and organizational participation (-0.37) have, as predicted, a significant negative effect on the crime rate. A salient and crucial finding contradicting the social capital theory is that neighbourhood trust has no significant independent effect on crime rates (0.17). Two of the three structural characteristics show no significant independent effects on crime rates; neither did the introduction of community trust change these in the equation.

Our test of the collective efficacy model demonstrates that concentrated disadvantage (0.34), immigrant concentration (0.40) and family disruption (-0.63) have substantial independent effects on crime rates. Collective efficacy, the key concept of this version of social disorganization, again has no significant impact (0.07).

Conclusions and Discussion

In the present study, we posed the question of whether social disorganization theory is valid for a Dutch city. Universal validity of Thomas's conceptual framework is usually assumed in the literature, but most of the empirical research has been carried out in American cities, notably Chicago. We identified six versions of social disorganization theory, translated them into empirically testable models and tested them on data from a survey among residents of 86 neighbourhoods in the city of The Hague, combined with census data and geo-coded police data on crimes and offenders (suspects). In correspondence with the methodology of Lakatos, we simultaneously tested six different social disorganization models that are the result of about a century of urban criminology. To make empirical comparisons with the US counterparts possible, we used measurement scales and census data as close as possible to the original measurements of the models as they have been used in studies in American cities (or, in the case of Sampson and Groves, on British Crime Survey data). We tested the six models on two dependent variables: offender rates and crime rates. Our units of analysis are the 86 small neighbourhoods in the city of The Hague with an average number of residents of 4,000–5,000.

Our study revealed that none of the six models is doing a good job in explaining the offender rates. Though SES (strong) and residential mobility (moderate) have empirical relationships with offender rates as predicted, residential mobility as one of the key concepts of disorganization has not. The effects of mediating variables as suggested in Shaw and McKay's model, social capital and of collective efficacy are absent in the data. A heterogeneous value system, trust among neighbours and collective efficacy that are very central in these versions play no role in explaining variations in crime and offender rates in our study. In our test of Sampson and Groves's version, local friendship networks, organizational participation and the presence of unsupervised peer groups in neighbourhoods have no empirical relation with offender rate. Structural variables like population density and level of urbanization show relations with offender rates that are in conflict with the theory. In addition, family disruption is only of significance when no other mediating variables are in the equation.

How well do these social disorganization models explain crime rates? The classic model and the Shaw and McKay model do not explain crime rates very well. Only ethnic heterogeneity has a significant influence, and the central concept of ‘the heterogeneous value system’ of the neighbourhood seems not to be of any importance. Our findings indicate that Shaw and McKay’s explanation of crime rates is not supported. Sampson’s extended model explains crime rates better: both ethnic heterogeneity and higher number of single-headed families has a relationship as predicted. In the Sampson and Groves model, the impact of ethnic heterogeneity becomes stronger, and that of single-headed families disappears, while level of organizational participation seems to play its role as predicted. Population density has an effect opposite to what was predicted: the higher the density, the lower the crime rates in neighbourhoods. The social capital and collective efficacy model encounter problematic outcomes with our data as well. Only two of the mediating variables play a significant role as the theory predicted.

Moreover, our empirical findings indicate meaningful differences between the models when explaining crime rates or offender rates. First, the structural characteristics have opposite effects on crime rates compared to offender rates. Low SES and high residential mobility seem to promote high offender rates, but seem not to affect the level of crime rates. Lower levels of urbanization and population density are related to lower levels of crime rates and not with higher levels of crime. Second, ethnic heterogeneity does not play a significant role in explaining offender rates. For crime rates, this neighbourhood characteristic has an important effect in three of the six models. Third, our data suggest that local friendship networks fail to explain offender rates in neighbourhoods while our results for crime rates are ambiguous. These differences point out that possibly there are distinct causal mechanisms responsible for crime rates and offender rates. Until now, criminologists have assumed that social disorganization is relevant for both in the same way.

When we compare our findings with recent tests of social disorganization outside the United States, we find striking similar as well as contradictory conclusions. Recently, Wikström and his colleagues found a strong relationship between collective efficacy and crime rates in the city of Peterborough (United Kingdom) (Wikström *et al.* 2012). In Stockholm, Wikström concluded 20 years earlier that the offender rate showed a clear relation with mobility and family disruption and no relationship with heterogeneity (Wikström 1991). For violent rates, Sampson and Wikström (2008a) found strong relationships with collective efficacy, concentrated disadvantage in a comparison between Chicago and Stockholm. However, recent research also indicated that social ties in urban neighbourhoods might not be relevant anymore in studying levels of crime and offender rates: ‘Yet as in the United States and Sweden, our Australian-based study finds that the presence (or absence) of dense, interlocking social ties in urban communities is not the most important factor in explaining variations in violence’ (Mazerolle *et al.* 2010: 20).

What may have caused these negative results of our tests of social disorganization theory? Limitations of our study may be relevant. One reason may be that our measurements of the neighbourhood characteristics are not valid, but we think it is not very likely. First, we stayed as close to the original measurements and we used ecological reliability coefficients as Sampson and his colleagues proposed (Raudenbush and Sampson 1999). These have proven to be very adequately in past research (Sampson *et al.* 2002). Second, we tested the six versions on all crimes and on all offenders without making distinctions in types of crime and kind of offenders. That may disguise meaningful differences among them. Third, spatial processes that originate outside the geographical scope of our data

may have caused biased estimates. For example, neighbourhoods on the edge of the city may be influenced by the proximity of neighbourhoods in adjacent municipalities. Given the satisfactory results of the estimated spatial error regression models, this is not very likely. Four, it could be that the specific physical and social structure of the city of The Hague have resulted in biased findings. However, despite some unique features, The Hague is not a very special city; in terms of physical infrastructure and population composition, it is quite similar to many other Dutch and European big cities.

Further, rival and alternative explanations to social disorganization may be needed to explain variations in offender and crime rates. The opportunity structure for crime may explain crime rates much better than social disorganization theory. These opportunities are more available in the centre of the city, with its shopping and entertainment areas. Moreover, the mobility of, especially younger, offenders has increased in the last 20 years. Residents are wealthier and travel more easily to other parts of cities than in the early days when social disorganization theory originated in criminology. This increased mobility may have caused the absence of a relationship between crime and offender rates in The Hague. Lastly, it is possible that, in Dutch and other European cities, neighbourhoods are less segregated than those in US cities and have less variation in wealth and housing. A distinct spatial and social structure of a Dutch city, together with a governmental policy of mixed housing and concentrated shopping and entertainment areas, can require other underlying causal mechanisms than in US cities. Sampson hinted at this spatial structure recently (Sampson 2012: 259–60). We did not study that empirically because that was beyond the scope of our paper and should be more explored and disentangled in neighbourhood and comparative research in the future (Mazerolle *et al.* 2010; Sampson and Wikström 2008a; Wikström 1991). More generally, much more research outside the United States is needed to assess the universal validity of social disorganization.

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Appendix: Pearson correlations between the theoretical concepts of six social disorganisation models in the city of The Hague (N=86)

	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀	X ₁₁	X ₁₂	X ₁₃	X ₁₄	X ₁₅	X ₁₆	X ₁₇
X ₁	-																
X ₂	.04	-															
X ₃	-.74*	-.07	-														
X ₄	.52*	.29*	-.65*	-													
X ₅	.44*	.30*	-.30*	-.65*	-												
X ₆	.75*	.19	-.96*	.70*	.39*	-											
X ₇	.57*	.24	-.71*	.92*	.46*	-.77*	-										
X ₈	-.32*	-.28*	.23	-.46*	-.77*	-.35*	-.44*	-									
X ₉	.28*	-.15	.38*	-.25	.00	-.38*	-.44*	.02	-								
X ₁₀	.56*	-.19	-.69*	.49*	-.03	.67*	.63*	.02	-.43*	-							
X ₁₁	.37*	-.21	-.52*	.42*	.15	.54*	.56*	-.00	-.10*	.53*	-						
X ₁₂	.15	.22	-.43*	.30*	-.05	.33*	.23	-.01	-.28*	.17	-.21	-					
X ₁₃	-.35*	-.05	.46*	-.34	-.11	-.37*	-.21	.21	-.13	-.31*	-.21	-.33*	-				
X ₁₄	.29*	-.20	-.33*	.32*	.14	.27	.21	-.08	.25	.36*	.32*	.02	-.64*	-			
X ₁₅	.60*	-.02	-.60*	.57*	.30*	.66*	.71	-.28*	-.29*	.76*	.55*	-.05	-.29*	.33*	-		
X ₁₆	-.61*	-.01	.76*	-.67*	-.28*	-.72*	-.68	.31*	.24	-.75*	-.48*	-.27	.67*	-.67*	-.72*	-	
X ₁₇	-.59*	-.03	.78*	-.70*	-.30*	-.74*	-.71*	.33*	.26	-.73*	-.47*	-.32*	.65*	-.59*	-.72*	.97*	-

* = $p < .01$ two sided

X₁ = Offender Rate 2009; X₂ = Crime Rate 2009;

X₃ = SES; X₄ = Ethnic Heterogeneity;

X₅ = Residential Mobility; X₆ = Concentrated Disadvantage;

X₇ = Immigrant Concentration; X₈ = Residential Stability;

X₉ = Heterogeneous Tolerant Value System; X₁₀ = Family Disruption;

X₁₁ = Urbanisation; X₁₂ = Structural Density;

X₁₃ = Local Friendship Network; X₁₄ = Participation in Neighbourhood;

X₁₅ = Unsupervised Peer Groups; X₁₆ = Neighbourhood Trust;

X₁₇ = Collective Efficacy.