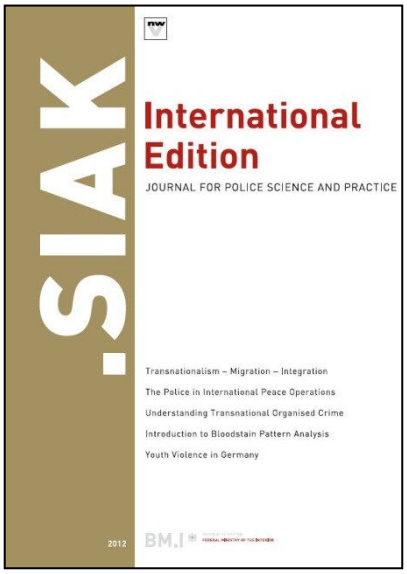
.SIAK-Journal – Journal for Police Science and Practice



Hermann, Dieter/Laue, Christian (2011):

Urban Structures and Crime

SIAK-Journal − Journal for Police Science and Practice (Vol. 1), 69-78.

doi: 10.7396/IE_2011_G

Please cite this articel as follows:

Hermann, Dieter/Laue, Christian (2011). Urban Structures and Crime, SIAK-Journal − Journal for Police Science and Practice (Vol. 1), 69-78, Online: http://dx.doi.org/10.7396/IE_2011_G.

published online: 3/2013

Urban Structures and Crime

Understanding the broken windows approach as an ecological theory focussing on the interrelationships of urban structures and crime, it can be summarized by the following hypotheses: (a) Worsening urban structural conditions lead to higher crime rates, higher fear of crime and to worse perception of quality of life. (b) An increase of delinquency rates, fear of crime and perceived negative quality of life in a district leads to migration and a change in the structural conditions. In this study cross-sectional data, representative surveys, and also longitudinal data about structural changes in German cities were used. The results largely confirm the broken windows approach; however, a modification should be taken into consideration. A supplementing of this approach can be reached by a combination with lifestyle approaches. Following this, crime rates in a district not only depend on structural variables, but also on the lifestyle of the inhabitants.

DIETER HERMANN,
Professor at the Institute of Criminology, University of Heidelberg.

CHRISTIAN LAUE,
Assistant Professor at the Institute of Criminology, University of Heidelberg.

1. INTRODUCTION

The broken windows approach can be interpreted as an ecological theory that describes the interrelationship between urban structures and crime (Wilson/Kelling 1982; Bottoms/Wiles 1997; Laue 1999; Hermann/Laue 2001). The concept has attained a relatively high status due to several applications in crime-prevention projects and to its attractive theoretical plausibility. The approach underlies completely different prevention strategies, such as the police tactics in New York that caused a worldwide sensation with the slogan "zero tolerance" (Kelling and Coles 1996; Green 1999), or "community policing" projects (Pate 1986) while other communal crime prevention measures also refer to Wilson and Kelling's broken windows approach (Wilson/Kelling 1982[1]). The great significance of the approach for crime policy justifies the attempt to test it empirically – and this is the central topic of this essay.

The many different applications of the broken windows approach show that it can be interpreted in several ways, making it necessary to specify the hypotheses of the approach more exactly prior to testing it empirically. Taking into consideration both the Wilson and Kelling study (Wilson/Kelling 1982), the city-sociological studies of the Chicago School (Shaw/Zorbaugh et al. 1929; Shaw/McKay 1931; Burgess/Bogue 1964; Shaw/McKay 1969) which, theoretically speaking, can be considered to be the basis for the broken windows approach, and Stark's theory (Stark 1987), the following hypotheses seem to summarize the approach:

- Different structural conditions in a neighbourhood influence the potential for formal control in this neighbourhood. The more intense these structural conditions are, for example, the heterogeneity and the degree of individualization of the inhabitants, as well as population density, the less intense is the potential for control. As a result, the delinquency rate and fear of crime increase and quality of life are perceived to be worse by the inhabitants.

Source: Hermann/Laue

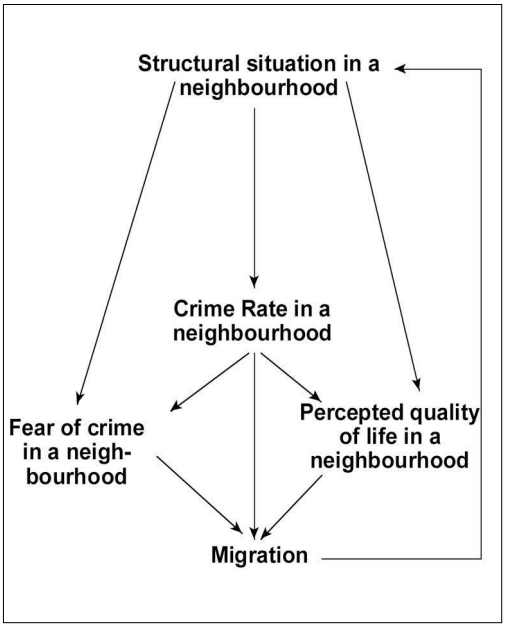


Fig. 1: Concept of an Ecological Theory of Crime in the Tradition of the Broken Windows Approach

Source: Hermann/Laue

Study	Design	Result
Zimbardo (1969)	Experiment: An old car is left in the Bronx (New York City) and in Palo Alto (California) to see how passers-by react	Confirmation of the theory for the Bronx, however, refutation for Palo Alto
Shaw, McKay (1931)	Criminal-ecological studies: Characterization of neighbourhoods with high crime rate by dilapidation, poverty, high percentage of foreigners, lacking social control and decreasing number of inhabitants	In most parts confirmation of the theory
Skogan (1990)	Secondary analysis of empirical criminal-ecological studies	Confirmation of the approach: Anomic conditions in neighbourhoods (disorder) decrease the ability of the community to react appropriately to criminality, and increase crime rate

Table 1: Empirical Studies on the Broken Windows Approach

- The higher the crime rate and the fear of crime in a neighbourhood and the worse the perceived quality of life, the higher the degree of migration is which leads to a reduced population density and, finally, to a change in the neighbourhood's structural conditions.

We can conclude in simplified terms that structural conditions in a neighbourhood are the reasons for crime rate, fear of crime and quality of life. These characteristics are the reason for a change in the population structure, which then leads to a change in structural conditions by a feedback process. This process is shown graphically by Figure 1.

Anomic structural conditions such as high population density, and above average heterogeneity and individualization of the population make it more difficult to create social networks and social control. Neighbourhoods where social control doesn't function show a higher crime rate and fear of crime, and the quality of life is considered worse by the inhabitants. Thus, they become less and less attractive as living areas, resulting in negative population development, which is the preliminary stage of increasing criminality. These relations describe an ecological theory of crime which can be considered as one of the elements of the broken windows approach.

2. EMPIRICAL STUDIES ON THE BROKEN WINDOWS APPROACH

So far, relatively few empirical studies have been made on the question conducted to test the validity of the broken windows approach. Table 1 shows examples of some studies. The criminal-ecological studies of Shaw/McKay (Shaw/McKay 1969) and Skogan (Skogan 1990) largely confirm the approach; Zimbardo's experiment (Zimbardo 1969), however, which has been taken as proof for the validity of the broken windows approach by Wilson and Kelling

(Wilson/Kelling 1982), at least partially refutes it. As a whole, the approach needs to be completed or modified.

3. DATA AND OPERATIONALIZATIONS

This study focuses on explaining the mechanisms of the ecological approach, rather than examining the complexities of the entire broken windows theory. We have analysed whether the conditions put forward in the broken windows approach can be refuted by an empirical study, and have concentrated purely on the existing hypotheses of an environmental theory of crime.

The hypotheses were first examined using cross-sectional data, that is, structural data of two university cities and representative surveys of their inhabitants. We then used longitudinal data to look at structural changes in neighbourhoods of German cities. The cross-sectional survey includes a questioning of victims so that information about the dark figure could be taken into consideration. Table 2 describes the data which are the basis of the analysis.

The structural data were taken from published statistics of the Offices for City Development and City Planning of the selected cities (Amt für Stadtentwicklung 1999). The survey data were taken from a project undertaken by Dieter Dölling and Dieter Hermann at the Institute of Criminology of the University of Heidelberg (Dölling/Hermann 1998; Hermann 1999; Hermann/Laue 2001).

The cross-sectional data are supposed to determine the influence of structural characteristics on delinquency, fear of crime and perceived quality of life. In addition, these data explain changes in the structure of the population. As the interrelation between structural conditions in a neighbourhood and migration cannot be examined with these data, longitudinal data were used for this purpose.

Source: Hermann/Laue

Study	Number of Cases	Year	Location	Sample
Victim Survey	2.930 persons	1998	Heidelberg Freiburg	Random sample of inhabitants of Heidelberg and Freiburg between 14 and 70 years
Structural Data	40 districts	1998	Heidelberg Freiburg	Total sample of all districts in Heidelberg and Freiburg
Longitudinal Data	191 districts	1994–1998	Frankfurt Heidelberg Köln München Rostock	Total sample of all districts in the cities

Table 2: Description of data

4. RESULTS

4.1. CROSS-SECTIONAL DATA

The statistical analysis was made with the help of data characterizing neighbourhoods. For this reason, the individual data used had to be aggregated at this level. The crime rate was measured by determining the percentage of victims in the neighbourhoods.[2] Levels of fear of crime and quality of life are given as the average value from the survey of those interviewed in the neighbourhood.

Methodologically speaking, these measurements at a neighbourhood level provide total surveys for two cities. Generalizations of the survey results beyond these communities are only possible on the plausibility level. However, it is possible to test the hypotheses with the regionally limited data, since the hypotheses of ecological theories of crime claim to be valid for all communities. The universality of

the hypotheses could thus be refuted with this survey.

In a statistical analysis of 40 cases, the number of variables with multivariate processes must be relatively low. For this reason, a path model[3] has been developed for testing the hypotheses which only contain variables with relevant effects. In the first step, characteristics were selected from structural data on population density[4], level of rents[5], ethnic, sex and age-specific segregation (percentage of foreigners, percentage of men, percentage of 10–17 year-old persons), degree of individualization (percentage of 1-person households), and migration (development of the population by immigration and migration) which, in bivariate analyses, are relevant to the crime rate. The significance level of the correlation coefficients was used as a relevance criterion. In the next step, we used the relevant structural characteristics: level of crime, fear of crime, perceived quality of life and structural population changes to define a path model similar to the conception of an environmental theory of crime shown previously. We defined any insignificant paths as irrelevant and excluded them from our model. The result of this analysis is shown in Figure 2. The numbers assigned to the paths are standardized partial regression coefficients.

Source: Hermann/Laue

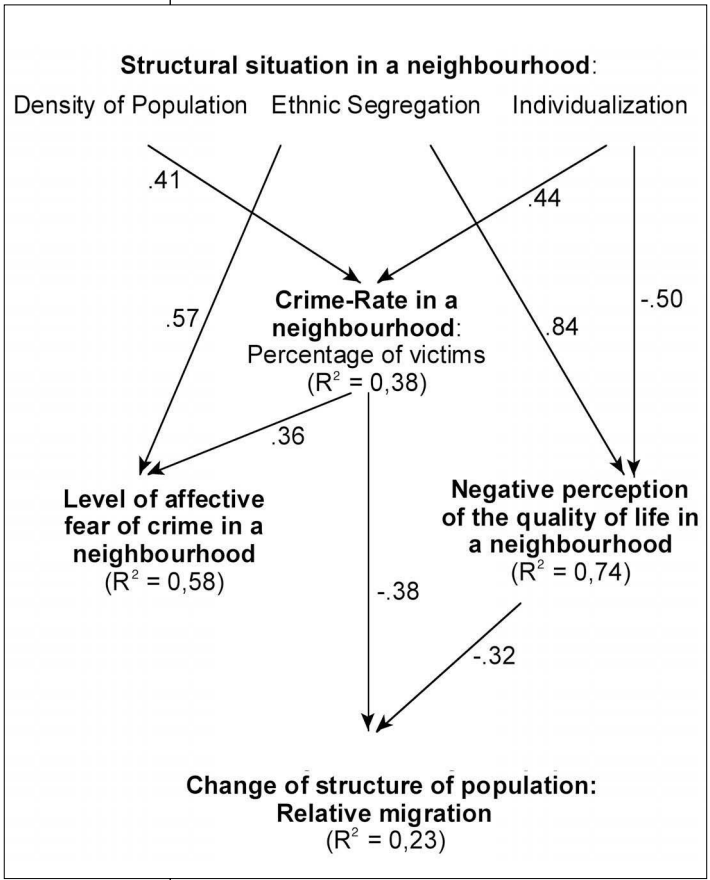


Fig. 2: Testing of the Hypotheses of an Ecological Theory of Crime by a Path Analysis

This diagram shows that the structural conditions of a neighbourhood influence its crime rate. The denser the population and higher the degree of individualization, the higher the crime rate is. Other structural conditions, especially the ethnic heterogeneity of the population[6], do not have an influence on this characteristic. In other words, the probability of an inhabitant of the neighbourhood falling victim to a crime will not change with an increasing percentage of foreigners in the neighbourhood, provided that population density and family structure of the inhabitants remain unchanged. Eisner (Eisner 1997, 121) came to the same result in an analysis on violent_crimes registered by the police in 24 cantons of Switzerland.

The level of fear of crime in a neighbourhood is influenced by local structural conditions as well as the actual crime rate. The higher the heterogeneity and the crime rate, the higher the fear of crime is. These results show the rational and irrational components of fear of crime. The relation between crime rate and fear of crime is rationally comprehensible, but the opposite holds true for the relation between percentage of foreigners and fear of crime, since the percentage of foreigners has no influence on the crime rate. This presumably contradicts the everyday theories of many people.

The aggregated data used here prove a relation between criminality and fear of crime. Questions such as whether becoming a victim changes the level of fear of crime and whether victims differ from non-victims concerning their fear of crime were mostly examined on an individual level and were answered differently (e.g. Boers 1991; Kury/Würger 1993). In this study, however, aggregate data have been used and this explains, at least partially, the discrepancies between the results of studies. Supposing that becoming a victim within the family and among neighbours does affect fear of crime, this mechanism is not taken into consideration in studies using individual data. In aggregate data, however, this kind of experience partially does count in measuring crime rates.

The level of the perceived quality of life in a neighbourhood depends on the heterogeneity and the degree of individualization in a neighbourhood. The higher the ethnic heterogeneity and the lower the degree of individualization, the worse the perception of the quality of life. This characteristic, as well as the crime rate, influences the development of the population. The higher the crime rate and the worse the quality of life in a neighbourhood, the higher the percentage of people leaving the neighbourhood is.

As a whole, the results of the empirical analysis confirm to a great extent the hypotheses of the ecological theory of crime presented here.

4.2. LONGITUDINAL DATA

Ecological theories of crime like the broken windows approach describe a long-term, dynamic development process. The different factors interplay with one another with different effects. Thus, structural conditions in a neighbourhood influence the fear of crime and perceived quality of life and therefore the development of the population. If it is assumed – as in the broken windows approach – that only those persons leave a neighbourhood who can afford to do so, which means that migration is selective, the development of the population influences the structure of the population and thus the structural conditions in a neighbourhood. In the worst case, this development is negative to such an extent that it results in a decline of the neighbourhood. This theory rests on the assumption that the development of the population really has an influence on the structural conditions, which can, however, only be proven by a longitudinal study.

The longitudinal data can be used to examine the feedback effect of migration in terms of whether an increased or decreased population affects the structural conditions in this neighbourhood. The structural conditions are measured using density of population[7], degree of individualization[8], ethnic segregation[9] and migration by percentage changes of the population. As these factors have been recorded over five years, it is possible to see the temporal relationship between cause and effect in the statistical analysis. Only previous measurements of the cause variables were used to determine the influence of these factors. In order not to distort the result through territorial reforms and changes to neighbourhood boundaries, neighbourhoods with changes in the development of population of 10 % and more were excluded from the study.

If the basic area of a neighbourhood remains the same, immigration or migration will, of course, change the population density. The empirically relevant question is, however, whether migration changes not just the density but also the composition of the population. If, in movements of the population, certain groups are systematically over or under-represented, thus leading to a change in the structure of the po-

pulation in a neighbourhood, this can eventually have an effect on criminality, fear of crime and quality of life.

The questions were tested using autoregressive models. This statistical procedure tests whether there are dependencies between interval-scaled variables. The dependent variable is not only explained by independent variables, but also by previous measurings of the dependent variable. The analysis assumes an autoregressive process of first order.[10] An autoregressive model of the first order assumes that the level of a variable at time t depends on the level of this variable at time of the previous year t-1.

The degree of order of the autoregressive model can be determined using theoretical considerations and statistical procedures. For the present application of the statistical procedure, it can be assumed that the degree of individualization and the ethnic segregation only depend on the level of this variable of the previous year but not of a time prior to that. The autocorrelation functions of the variables taken into consideration show a pattern that speaks for autoregressive models of the first order.[11]

The influence of migration on the degree of individualization and ethnic segregation was determined both for all 191 neighbourhoods and for a selection of neighbourhoods. According to the concept of the ecological theory of crime, anomic structural conditions lead to a decrease in population, in turn aggravating the anomy. The interrelationship between structure and migration is thus said to lead to an escalation of anomic structural conditions. We therefore analysed neighbourhoods showing a well-developed escalation process. For this reason, neighbourhoods were selected with a relatively high density of population, ethnic segregation or degree of individualization. The 75 %-percentiles have been used as limit values for this selection, meaning that all neighbourhoods that display the following characteristics have been taken into consideration:

1. a higher density of population,
2. a higher percentage of foreigners and
3. a higher percentage of one-person-households than 75 % of all neighbourhoods.

Table 3 shows the results of autoregressions with regard to the influence of migration on the degree of individualization and ethnic segregation.

When we look at all neighbourhoods, the influence of migration and immigration on ethnic segregation and individualization is not significant. However, if we take into consideration only those neighbourhoods with anomic structural characteristics,

Source: Hermann/Laue

The effect of migration (M) on ...	Autoregressive models	Selection of districts
Ethnic segregation (E)	$E(t) = 0{,}99^{(s)} \cong E(t-1) - 0{,}09^{(ns)} \cong M(t-1)$	All districts (n=191)
Individualization (I)	$I(t) = 1{,}0^{(s)} \cong I(t-1) - 0{,}11^{(ns)} \sim M(t-1)$	
Ethnic segregation (E)	$E(t) = 0.98^{(s)} \cong E(t-1) - 0{,}59^{(s)} \cong M(t-1)$	Selection: $D_1 \ni 71{,}8$ or $D_2 \ni 58{,}2$ or $E \ni 23{,}6$ or $M \ni 52{,}0$ (n=95)
Individualization (I)	$I(t) = 1{,}0^{(s)} \cong I(t-1) - 0{,}24^{(ns)} \cong M(t-1)$	

Table 3: Testing of Hypotheses of an Ecological Theory of Crime by Autoregressive Models

migration affects ethnic segregation significantly but has no effect on individualization. Thus, changes in population do not usually change the structural conditions of neighbourhoods. In neighbourhoods with an anomic situation, however, migration leads to an increase in ethnic segregation.

The influence of migration on the density of population was not determined by autoregression, and the relationship between these characteristics can be derived logically. Each change in population has an effect on the number of inhabitants and thus on the population density, if the area itself remains unchanged. In 90 % of all neighbourhoods, the building covered area changed by less than 0.3 % a year, so we can conclude that there is a close relationship between migration and population density.

4.3. SUMMARY OF THE CROSS-SECTIONAL AND LONGITUDINAL DATA ANALYSES

Figure 3 shows a summary of the results of the cross-sectional and the longitudinal studies: A high population density leads to a relatively high crime rate, and a high degree of ethnic segregation leads to a negative assessment of the quality of life. A high crime rate and a low quality of life lead to migration away from the neighbourhood, this leading, on the one hand, to a decrease in the population density and on the other hand, to an increase in ethnic segregation. While a reduction in population density leads to a lower crime rate and thus to an increase in population, an increase in ethnic segregation leads to a negative evaluation of the quality of life, and thus to a decrease in population. Therefore decreasing numbers of inhabitants of neighbourhoods do have both an anomy-reducing as well as an anomy-increasing effect that is an escalating as well as a deescalating effect.

The results of the empirical analyses partially refute the broken windows approach. A negative development of the population is not the first prerequisite for a rising crime rate, as put forward by the broken windows approach. First, a reduction in population leads to a reduction in the population density and thus to decreasing crime rates. Second, decreasing numbers of inhabitants influence ethnic segregation; this, however, does not have an influence on the crime rate. The negative evaluation of a negative population development can not therefore be proven.

In addition, the hypothesis of a crime-escalating momentum of anomic structural situations cannot be confirmed. However, an interrelationship between the structural situation in a neighbourhood, criminality, fear of crime, evaluation of the quality of

Source: Hermann/Laue

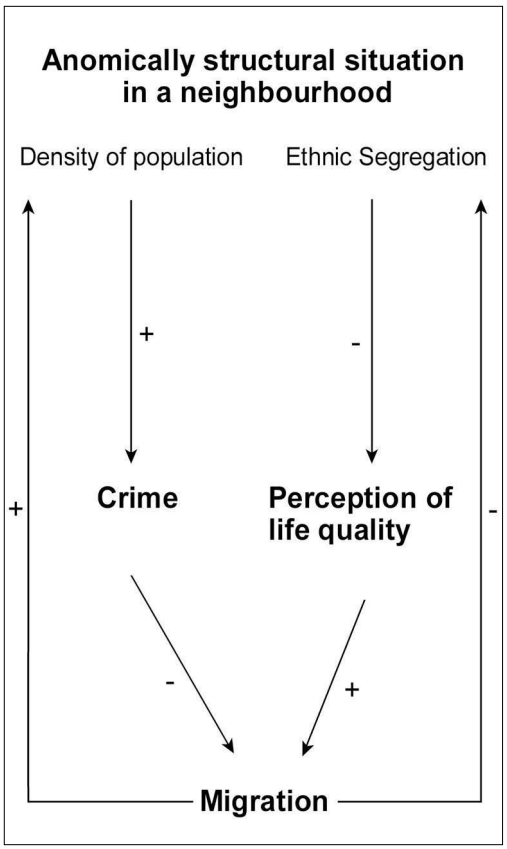


Fig. 3: Tested Concept of an Ecological Theory of Crime

life and migration can be confirmed. However, the relations seem to be more complex than assumed in the broken windows approach.

Finally, we could not confirm that anomic structural conditions increase the levels of crime although a clear inter-relationship between the structure of the neighbourhood, fear of crime, evaluation of the quality of life and migration has been determined. The relationship is, however, more complex than originally assumed in the broken windows approach.

[1] *For the original essay, see internet via http://www.theatlantic.com/election/connection/crime/windows.htm.*

[2] *The following delicts have been taken into consideration in the questions on victimization: theft of a car, a motorcycle or a bicycle, theft in/out of the car, damage of the car, residence burglary, attempted residence burglary, damage to property, theft, robbery, physical injury, threatening and sexual nuisance. The question was whether the event had taken place during the past twelve months. The question regarding affective fear of crime was formulated as follows: "How often do you think that you yourself can become the victim of a crime?" and "Are you afraid of becoming the victim of a crime at night, alone in your neighbourhood?". The measurement of the subjective quality of life was made by the question on the estimation of the quality of life for the neighbourhood of the interviewed with the help of the school mark scale.*

[3] *The path analysis is a statistical procedure able to determine the level of influence relations in complex relations of variables. The procedure is frequently used to develop causal models or to test their validity (Hermann 1984; Opp/Schmidt 1976).*

[4] *Inhabitants per hectare of built-up area.*

[5] *Supplements and reductions according to neighbourhood following the Heidelberg 1998 average rent system.*

[6] *The heterogeneity of the population is measured by the percentage of foreigners in a neighbourhood.*

[7] *For some cities tested, data for "inhabitants per hectare of built-up area" were available; for others, the density of population has been operationalized as "inhabitants per hectare of total area of a neighbourhood".*

[8] *Percentage of single-person households.*

[9] *Percentage of foreigners.*

[10] *A stochastic process Xt is called "autoregressive process of first order i" if Xt = a1Xt-1 + a2Xt-2 + ... + aiXt-i + et with et being an accidental mistake, a "white-noise-process" with expected value zero (Schlittgen/Streitberg 1999).*

[11] *The autocorrelation function ACFi is the relation between the time-depending characteristic X(t) and the time-delaying values of this characteristic: ACFi = Corr(Xt, Xt-i). If this correlation is getting ever smaller with increasing temporal interval of the correlated variables, this speaks for the use of an autoregressive model of first order (SPSS Trends 10.0, Supplement). This is the case with all variables taken into consideration here.*

Sources of information

Amt für Stadtentwicklung und Statistik Heidelberg (1999). Statistische Datenblätter. Statistische Informationen zu den Stadtteilen 1997 und 1998. http://www.heidelberg.de/index2.htm.

Boers, K. (1991). Kriminalitätsfurcht, Pfaffenweiler.

Bottoms, A. E./Wiles, P. (1997). Environmental criminology, in: Maguire, M./Morgan, R./Reiner, R. (eds.) The Oxford handbook of criminology, Oxford, 305–359.

Burgess, E. W./Bogue, D. J. (1964). The delinquency research of Clifford R. Shaw and Henry D. McKay and associates, in: Burgess, E. W./Bogue, D. J. (eds.) Contributions to urban sociology, Chicago, 591–615.

Dölling, D./Hermann, D. (1998). Der Einfluß von Wertorientierungen und Lebensstilen auf Viktimisierungen, Kriminalitätsfurcht und selbstberichtete Delinquenz. Forschungsantrag, Heidelberg.

Eisner, M. (1997). Das Ende der zivilisierten Stadt? Die Auswirkungen von Modernisierung und urbaner Krise auf Gewaltdelinquenz, Frankfurt/New York.

Green, J. (1999). Zero tolerance: A case study of police policies and practices in New York City, Crime & Delinquency (45), 171–187.

Hermann, D. (1984). Ausgewählte Probleme bei der Anwendung der Pfadanalyse, Frankfurt/Main.

Hermann, D. (1999). Kriminalität und Lebensqualität in Heidelberg und Freiburg. Untersuchungen und Vorschläge zur Kommunalen Kriminalprävention in den Stadtteilen Boxberg,

Emmertsgrund und Kirchheim. Abschlussbericht, Heidelberg.

Hermann, D./Laue, C. (2001). Ökologie und Lebensstil. Empirische Analysen zum „broken windows"-Paradigma, in: Jehle, J.-M. (Hg.) Raum und Kriminalität, Mönchengladbach, 89–120.

Kelling, G./Coles, C. (1996). Fixing Broken Windows, New York.

Kury, H./Würger, M. (1993). Opfererfahrung und Kriminalitätsfurcht. Ein Beitrag zur Viktimisierungsperspektive, in Kaiser, G./Kury, H. (Hg.) Kriminologische Forschung in den 90er Jahren. Beiträge aus dem Max-Planck-Institut für ausländisches und internationales Strafrecht, Freiburg i. Br., 411–462.

Laue, C. (1999). Anmerkungen zu Broken Windows, Monatsschrift für Kriminologie und Strafrechtsreform (82), 277–291.

Opp, K.-D./Schmidt, P. (1976). Einführung in die Mehrvariablenanalyse. Grundlagen der Formulierung und Prüfung komplexer sozialwissenschaftlicher Aussagen, Reinbek.

Pate, A. M. (1986). Experimenting with foot patrol: The Newark experiment, in: Rosenbaum, D. P. (ed.) Community crime prevention. Does it work?, Beverly Hills, 137–156.

Schlittgen, R./Streitberg, B. H. J. (1999). Zeitreihenanalyse, München.

Shaw, C. R./Zorbaugh, F. M. et al. (1929). Delinquency areas, Chicago.

Shaw, C. R./McKay, H. D. (1931). Social factors in juvenile delinquency, National Commission on Law Observance and Enforcement, Publication No. 132, Volume II.

Shaw, C. R./McKay, H. D. (1969). Juvenile delinquency and urban areas, Chicago.

Skogan, W. J. (1990). Disorder and decline. Crime and the spiral of decay in American neighborhoods, New York.

Stark, R. (1987). Deviant places: A theory of the ecology of crime, Criminology (25), 893–909.

Wilson, J. Q./Kelling, G. L. (1982). Broken windows. The police and neighborhood safety, The Atlantic Monthly (March 1982), 29–39.

Zimbardo, P. G. (1969). The human choice: Individuation, reason and order versus deindividuation, impulse and chaos, in: Arnold, W. J./Levine, D. (eds.) Nebraska symposium on motivation, Lincoln, 237–305.

Further literature

Hermann, D./Dölling, D. (2001). Kriminalprävention und Wertorientierungen in komplexen Gesellschaften. Analysen zum Einfluss von Werten und Lebensstilen auf Delinquenz, Viktimisierungen und Kriminalitätsfurcht, Mainzer Schriften, Mainz.