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NEIGHBOURHOOD DISORDER AND WORRY ABOUT CRIMINAL VICTIMIZATION IN THE NEIGHBOURHOOD*

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ABSTRACT

This study tested a cross-level integrated model of neighbourhood level disorder and individual level vulnerability, in relation to explaining individual differences in worry about criminal victimization[1]. The aim of the present study is (1) to establish if there is unique neighbourhood level variation in worry about criminal victimization, independent of neighbourhood composition, and (2) to establish the extent to which two proposed mechanisms at the individual level, prior local victimization and perceived disorder, act as mediators of a hypothesised effect of neighbourhood level disorder. Given the hierarchical structure of the research question a series of multilevel analyses based on data from a survey of more than 4,000 residents of a Swedish urban area was performed. Findings by and large indicate that there are significant neighbourhood level differences in worry about criminal victimization and that these differences are not completely due to compositional effects. Neighbourhood disorder has effects on worry about criminal victimization, independent of the composition of neighbourhoods. The present study suggests that neighbourhood disorder has consequences for worry about criminal victimization and that prior victimization and perceived disorder are key mediators of the contextual effect of neighbourhood disorder. The implications of these findings are discussed.

Keywords: Fear of crime, disorder, victimization, neighbourhood effects, multilevel, Sweden

INTRODUCTION

A large body of research on neighbourhood effects has established that the presence of disorder in residential neighbourhoods is key in explaining both neighbourhood level crime rates and individual differences in (dimensions of) fear of crime, local victimization and other behavioural and attitudinal outcomes. Although the extensive amount of research on fear of crime that has been conducted over recent decades has produced evidence of a relationship

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between neighbourhood context and fear of crime (Skogan and Maxfield, 1981; Lewis and Salem, 1986; LaGrange *et al*., 1992), there is still a lack of knowledge as to the mechanisms through which the neighbourhood context operates to influence individual fear.

Using multilevel analysis, this study specifically investigates how neighbourhood-level disorder can explain individual differences in worry about criminal victimization taking place in the residential neighbourhood. Neighbourhood level disorder is defined as the average level of perceived disorder in the neighbourhood and aggregated from survey responses. At the same time we investigate to what extent prior victimization (i.e. victimization within the residential area) and individually perceived disorder can act as mediators of the hypothesised stimulating effect of neighbourhood level disorder on worry about criminal victimization. The study of neighbourhood effects remains important if we consider the argument that a person's life-quality might vary depending simply on where that person lives. A neighbourhood contextual effect is defined as an effect of the local neighbourhood context on individual level behavioural or attitudinal outcomes that exists independent of the compositional make-up of the neighbourhood.

Studies conducted in the US and Europe demonstrate the existence of contextual effects of neighbourhood disorder on individual differences in fear of crime (e.g. LaGrange *et al.,* 1992; Pain, 2000). Swedish studies have consistently shown that fear of crime is unequally distributed across areas at multiple levels of aggregation, such as cities, municipalities, and neighbourhoods (Wikström, 1991; Dolmén, 2002; Litzén, 2006; Estrada and Nilsson, 2008). However, former Swedish studies have not convincingly been able to show whether area differences merely reflect the effect of an unequal distribution of inhabitants across areas or whether the area itself plays an important role in shaping individual differences in worry about criminal victimization. In other words, our knowledge is limited when it comes to saying whether some people are more worried than others because of individual background characteristics (compositional effects) or whether they are more worried because they live in areas with high levels of disorder (contextual effects).

Explanations of neighbourhood differences in fear of crime can broadly be either compositional or contextual in nature. In compositional explanations, the ecological variation in a phenomenon is viewed as completely due to differences in the demographic composition of the neighbourhood. That is, people with certain individual characteristics associated with fear cluster in certain neighbourhoods (e.g. the elderly, women, and individuals with a lower socio-economic status). These individuals would feel equally afraid wherever they lived, and their fear has little to do with neighbourhood context. In contextual explanations, characteristics of the neighbourhood are instead viewed as having an independent effect on the individual. The neighbourhood context may have a stronger influence on some people than others, but the context influences individual behaviour or attitudes regardless of its composition. That is, a contextual effect causes people with the same characteristics to have different levels of fear of crime depending on where they live (Curtis and Jones, 1998). What seems most likely, however, is that variations in fear of crime are due to both compositional and contextual effects.

NEIGHBOURHOOD CONTEXT AND FEAR OF CRIME

A classic finding is the existence of variations in fear of crime between different urban locations (Covington and Taylor, 1991; Chandola, 2001; Sampson, 2003; Fitzgerald, 2008). In more recent years, both sociological and public health research have established the neighbourhood context as an important factor for explaining differences in individual fear of crime (Wikström, 1991; Smith and Torstensson, 1997; Dolmén, 2002; Litzén, 2006). In the present study we highlight neighbourhood disorder as an important neighbourhood condition in the explanation of variations in how often people worry about criminal victimization in the residential neighbourhood. Previous research has established that structural disadvantage leads to decreased levels of informal control (Sampson and Raudenbush, 1999; 2004), which allows disorder to penetrate the area. As neighbourhood disorder is a consequence of macro level structures and mechanisms, it is important to answer the question why and how neighbourhood disorder affect peoples' lives? Disorder can be either social or physical. Social disorder refers to behaviours such as loitering and public drinking whereas physical disorder refers to visible signs in the surroundings, such as graffiti, litter in the streets, and broken windows.

'Fear of crime' studies have also produced support for the view that individuals who share some structural background characteristics that make them more physically and socio-economically vulnerable feel less safe than others, worry more frequently about victimization, and experience more fear (Garofalo, 1981; Ferraro and LaGrange, 1987; Ericksson, 2008). This phenomenon is also known as the fear of crime paradox, as vulnerable groups sometimes are less victimised. The fear of crime paradox, originally described by Furstenberg (1971), has therefore been the issue in many debates (see Ditton and Farrall, 2000). Contemporary versions of the social disorganisation perspective (Shaw and McKay, 1942), known as collective efficacy theory (Sampson *et al.*, 1997), and a concurrent theoretical model, known as the 'Broken windows' theory (Wilson and Kelling, 1982) have been used as theoretical frameworks to explain neighbourhood differences in disorder and have focused on the effects of disorder on individual level outcomes. Social disorganisation theory and its contemporary counterpart, collective efficacy theory, see disorder as an outcome of neighbourhood structural characteristics, especially disadvantage, which may have implications for individual level outcomes, such as the development of fear. Broken windows states that ecological concentrations of disorder act as visible signs of crime and suggest that nobody cares in the area, thus heightening inhabitants' perceived risk of becoming a victim, avoidance behaviour and emotional anxiety, or fear of crime, irrespective of whether they take the form of social or physical disorder, and independent of individual background characteristics that refer to vulnerability. Furthermore, the presence of disorder in neighbourhoods signals not only the potential for crime to occur but is also suggestive of the idea that the neighbourhood is deteriorating and that a negative spiral of urban decay may occur. This is all part of an individual interpretative process relating to environmental information that shows that signs of disorder are socially constructed (Ferraro, 1995). Taylor (2001) found empirical support for this notion and concluded that perceptions of disorder vary between individuals in the same neighbourhood, suggesting that such perceptions are conditioned by vulnerability. Residents that report fear also report more neighbourhood disorder as compared to less fearful residents in the same neighbourhood (Taylor and Covington, 1993)[2].

'Broken windows' theory has greatly influenced crime control policy, especially zero tolerance policing (Sampson and Raudenbush, 1999), and is one very influential yet controversial[3] perspective on fear of crime across American and European contexts (Skogan, 1990; Wikström and Dolmén, 2001; McCord *et al.*, 2007; Franklin *et al.*, 2008; Wyant, 2008). Given the powerful influence of disorder on strategies to prevent crime and reduce fear, understanding perceived and neighbourhood-level disorder is fundamental to understanding differences in worry about criminal victimization. A related issue, which further emphasises the importance of understanding disorder, is the negative effect of disorder on potential investors, local businesses, real estate prices, and mobility, to mention but a few (Sampson and Raudenbush, 1999).

A CROSS-LEVEL INTEGRATED MODEL OF WORRY ABOUT CRIMINAL VICTIMIZATION

The present study proposes a cross-level integrated model which links area-level characteristics and individual-level characteristics to explain *how* and *why* the neighbourhood matters in the explanation of individual differences in worry about criminal victimization in the residential neighbourhood. The theoretical model integrates characteristics and mechanisms of both the individual and the setting in which the individual lives, i.e. the area of residence. At the individual level, we take into account social structural characteristics that refer to both physical and social vulnerability, and that make up part of the demographic composition of areas. Structural characteristics that refer to physical vulnerability are gender, age, and immigrant background. Structural background characteristics that refer to economic vulnerability are income and family structure. The basic assumption of vulnerability theory, which has gained some empirical support, is that fear is greatest among individuals who are hypothesised to be socially, physically, or economically vulnerable (Warr, 1984; Junger, 1987; Ferraro and LaGrange, 1987; Ferraro, 1995; Hale, 1996; Smith and Torstensson, 1997; Dolmén, 2002; Erickson, 2008). These structural background characteristics are necessary to include in the equation as they are important in identifying unique neighbourhood level variation. Additionally, in this study, neighbourhood disorder is seen as a consequence of disadvantage (especially economic vulnerability or an ecological concentration of poor people). Such areas are more vulnerable to the development of disorder and an invasion of crime than areas that are not characterised by disadvantage. Worry about criminal victimization has an apparent contextual dimension since it involves an interpretative process that is not solely conditioned by individual background characteristics relating to individual vulnerability. Area characteristics such as disorder are especially hypothesised to have consequences for worry about criminal victimization: (1) if the climate of disorder attracts potential offenders and thus increases the chances that an area inhabitant becomes a victim of a crime in that area; and/or (2) if the inhabitant perceives disorder. Prior victimization and perceived disorder are thus two mediators posited as crucial for our understanding of the effect of neighbourhood disorder on worry about criminal victimization.

Neighbourhood disorder is a consequence of structural constraints such as neighbourhood disadvantage and should be considered part of a larger community context. Disorder arises in neighbourhoods characterised by a lack of social and economic resources and these structural constraints undermine collective efficacy, which in turn fosters disorder and crime. Structural conditions such as neighbourhood disadvantage locate population groups with varying levels of socioeconomic vulnerability to crime in different places. There is a hypothesised link between prior victimization and perceived disorder; prior victimization experiences may make people more aware of potential danger, and therefore they may perceive visible signs of decay more than those who never became a victim within their area of residence. The hypothesised effects of neighbourhood disorder on worry about criminal victimization are presented in Figure 1.

HYPOTHESES

The key issues in the present study are to what extent there are individual differences in worry about criminal victimization by neighbourhood, and what are the mechanisms through which the neighbourhood context influences individual differences in worry about criminal victimization. We specifically investigate the following hypotheses: (1) there is significant variance between neighbourhoods that is not due to compositional differences; (2) the contextual variable neighbourhood disorder has an independent effect on worry about criminal victimization, controlling for compositional effects; (3) indicators of vulnerability have independent effects on worry about criminal victimization; (4) prior victimization experiences mediate the effect of neighbourhood disorder

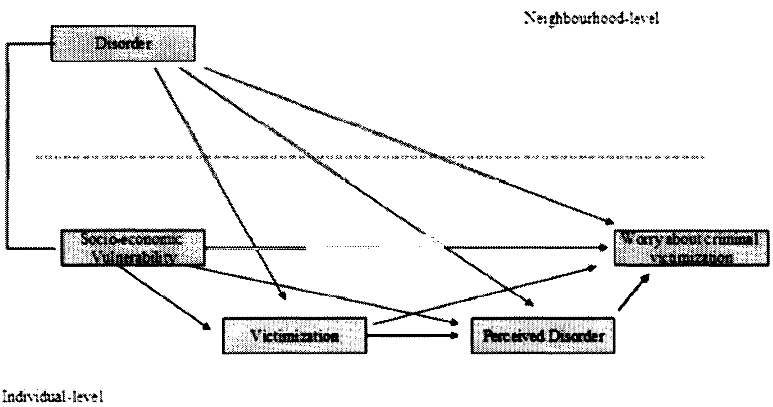

Figure 1. Theoretical model.

and indicators of vulnerability; (5) prior victimization has an independent effect on worry about victimization; (6) perceived disorder has an independent effect on worry about victimization; (7) perceived disorder mediates the effects of prior victimization background characteristics and neighbourhood disorder.

DATA AND SAMPLE

The survey data were provided by The Malmo Fear of Crime Survey, a cross-sectional study conducted in the police district of Malmo in 1998 (Torstensson, 1999). Questionnaires were administered to a random sample of 7,000 people between the ages of 16 and 85 living within the police district of Malmo, which comprises the two municipalities of Malmo and Burlov. The overall response rate was 76 percent. For the current study, only respondents living in Malmo were selected, 4,911 individuals (response rate = 71.6%). Respondents were asked questions about personal characteristics and neighbourhood context.. The final sample consists of 44.3 percent women and 55.7 percent men. A total of 59.5 percent of the respondents are married or cohabiting with a partner and 28.4 percent have at least one parent with an immigrant background. Respondents range in age from 16 to 85 years with an average of 47.5 yeas. 20.5 percent of the sample have a university education. We were able to compare the characteristics of the sample with population data for the city of Malmo. The study sample is representative of the city population across key variables but women are somewhat under-represented (52.1 percent in the Malmo population).

Respondents are distributed across 110 geographical neighbourhoods as defined by city planning authorities, which are homogenous in key variables such as housing tenure. Raudenbush and Sampson (1999) recommend a net sample size of 25–30 respondents per neighbourhood unit to maximize ecological reliability when neighbourhood residents are used as informants and as the basis for measures of neighbourhood level mechanisms. They also found that having more than 40 respondents per area did not add significant improvement of ecological reliability (Raudenbush and Sampson, 1999). Small samples of individuals per unit may lead to underestimation of the effect of neighbourhood characteristics (Sellström and Bremberg, 2006). In this study, only areas with a minimum of 20 respondents are included[4]. As a consequence, 31 units have been excluded from the analysis. This leaves a total of 79 level-2 units, representing 72 percent of the total number of areal units, which reduces the initial sample size by 5 percent (from 4,911 to 4,672 respondents). On average there are 59 respondents per area (Min: 20, Max: 165).

MEASURES

'A community may be defined as the social and built environment of a common locality' (Wikström and Sampson, 2003: p. 126). In the present study, neighbourhoods are not necessarily considered as communities, but as local social areas that have gained meaning for the inhabitants. Neighbourhoods are measured as areas of residence, and as small and homogeneous areas, but defined by administrative borders. We acknowledge that what constitutes a neighbourhood in the administrative sense is unlikely to be a perfect match with respondents' definition of their neighbourhood. All survey questions on the neighbourhood of residence refer to 'the neighbourhood in which you live', thus indicating the area closest to the respondent's home.

Worry about Criminal Victimization

The dependent variable is a three-item measure. The survey asked respondents how frequently they worried about becoming the victim of burglary (house or apartment, including attic or basement), their vehicle being stolen while in the neighbourhood (car, motorcycle or bicycle) or becoming attacked or abused in their residential neighbourhood. Responses were measured on an ordinal scale ranging from never worried to very often (0 = never, 1 = only occasionally, 2 = quite often or very often). Variable scores are added together to produce a summed score[5]. The alpha coefficient of reliability for the worry about criminal victimization scale (0.738) is in line with other studies that have employed similar scales (Adams and Serpe, 2000).

Background Variables

Background variables used in the analyses refer to the demographic composition of neighbourhoods and to vulnerability[6]. The following background characteristics are included to control for the socio-economic and demographic composition of the neighbourhood, i.e. compositional effects[7]: age, sex (1 = female, 0 = male), marital status (1 = single, 0 = married or cohabiting), immigrant background[8] (1 = at least one parent born abroad, 0 = both parents born in Sweden). Length of residence is a control variable and is coded 1 if the respondent has lived for five years or more in the same house/building as at the time for the survey, 0 if less than 5 years in the same house/building. Housing is coded 1 for a multi-family dwelling, 0 for a single family housing, and education is coded 1 for no university education and 0 for university education.

Prior Victimization

This refers to whether the respondents had been exposed to one or more crimes (theft, violence or vandalism in the residential neighbourhood) during the 12-month period prior to the survey. The victimization variable is dichotomous, with 1 referring to having experienced victimization, 0 for no victimization. Approximately 34 percent of respondents reported victimization, with 1.9 percent reporting violent victimization, 26 percent theft, and 14 percent vandalism.

Perceived Disorder

Respondents were asked to assess how great a problem nine forms of social and physical disorder posed in the neighbourhood (0 = not present, don't know[9], 1 = present but not a problem, 2 = somewhat of a problem or serious problem). The summed score is based on the presence of the following: litter, vandalism, disturbing neighbours, people drinking in public, people fighting in public, apartments used by alcoholics and drug users, rowdy youths, women being molested, and disturbing traffic. High values reflect higher levels of disorder. The internal consistency of the disorder scale is high (Alpha = 0.819). See Table 1 for descriptive statistics of the included variables.

Neighbourhood Disorder

Neighbourhood disorder is measured as the neighbourhood level average of perceived disorder[10]. We aggregated this perceptual measure after carefully checking the ecological reliability of the concept. To assess ecological reliability, Raudenbush and Sampson introduced the lambda parameter (Raudenbush and Sampson, 1999). This parameter can be estimated by the program HLM version 6.6 (Raudenbush *et al.*, 2004). Lambda should be

TABLE 1
Descriptive statistics

	Range	M	SD
Housing	0–1	0.26	0.441
Immigrant background	0–1	0.76	0.42
Sex	0–1	0.56	0.50
Marital status	0–1	0.41	0.49
Length of residence	0-1	0.55	0.50
Age	16–85	47.49	18.74
Education	0–1	0.22	0.42
Prior victimization	0-1	0.34	0.48
Perceived disorder	0-18	7.13	4.58
Neighbourhood disorder	2.24–11.05	6.80	2.10
Worry about criminal victimization	0–8	3.9	2.15

interpreted as the ecological counterpart of Cronbach's alpha and should be around 0.80 for ecologically reliable estimates (Sampson and Raudenbush, 1999; Pauwels and Hardyns, 2009). The lambda value for neighbourhood disorder is 0.902, which indicates very high ecological reliability (see Table 2). previously we assessed the correlational validity of the neighbourhood measure of disorder and it was found that the measure was strongly positively correlated with disadvantage as measured by social and economic structure (Mellgren *et al.*, 2010).

ANALYTICAL STRATEGY

In neighbourhood studies the contextual effect represents the situation where place characteristics have a direct effect and can be equated with 'genuine ecological effects' (Subramanian, 2005). Contextual effects may either impact on all individuals equally, or more on some types of individuals than others.

TABLE 2
Reliability estimation for neighbourhood disorder

Variance Components	Disorder
Within-neighbourhood variance	17.46
Between-neighbourhood variance	3.86
ICC	18
Reliability	0.90

In other cases, higher-level groupings may arise for reasons strongly associated with the characteristics of individuals, such as the allocation of young adolescents to schools, or the choice of a residential area by certain types of parents of children, e.g. poor families deciding to live in the poorest area. In that case differential selection is responsible for an observed difference between higher-level units. This is called the selection effect or compositional effect. The latter refers to the idea that place differences are an artifact of differential socioeconomic composition. A purely compositional explanation for observed area variations in an individual outcome would be that the sort of people whose personal and household characteristics are associated with offending rates tend to live in certain sorts of regions or localities, and this is why the rates there are high; such people would offend at a certain level wherever they lived, and the place itself has no effect on their frequency of offending[11].

A series of hierarchical block-wise regressions were performed using HLM 6.6 (Raudenbush *et al.*, 2004) to test each of the proposed hypotheses. By distinguishing analytically between neighbourhood-level and individual-level characteristics, insights are gained into the relative importance of the neighbourhood context for the individual outcome, worry about criminal victimization. Block-wise regression analysis is used to test the independent effects of background characteristics that refer to neighbourhood composition (in terms of vulnerability), neighbourhood level disorder, prior victimization and perceived disorder on worry about criminal victimization. The order to introduce concepts into the analyses was derived from the theoretical model described above. The analyses conducted thus allow the evaluation of neighbourhood level variation in worry about criminal victimization, and establishing the nature of the observed neighbourhood differences. To test whether there is neighbourhood level variation in worry about criminal victimization; an empty random intercept model was run (*Model 1*). The next step in the analysis was to establish whether significant variation exists, above and beyond compositional effects of neighbourhood inhabitants (*Model 2*). Next, neighbourhood disorder was introduced to test whether neighbourhood disorder has an independent effect on individual differences in worry about criminal victimization, controlling for compositional effects of background characteristics that refer to vulnerability (*Model 3*). In *Model 4* prior victimization was introduced into the equation. If prior victimization mediates the effect of neighbourhood disorder, then the effect of neighbourhood disorder should decline and there should be an independent effect of prior victimization on worry about criminal victimization. In *Model 5*, we introduced perceived disorder; because we hypothesise that prior victimization may increase the perception of disorder, as well as further mediate the effect of neighbourhood disorder.

RESULTS

Following the proposed theoretical causal order we begin the analysis by investigating whether a significant amount of variance in worry about criminal victimization lies between neighbourhoods. The first intercept-only model, also referred to as the empty model, determines the baseline variation in the dependent variable (Snijders and Bosker, 2004). The amount of variance that is exclusively situated at the higher level (neighbourhood) is expressed as the intra class coefficient (ICC). The results (Table 3) show that approximately six percent of the variance in worry about criminal victimization lies between neighbourhoods which makes the context an interesting aspect to investigate further.

The effect size of six percent is expected based on empirical findings in Swedish settings but smaller than effect sizes found in international studies. In a Swedish setting, Lindström *et al.* (2003) found that the contextual variable 'social capital' partly explained (7.2 percent) individual variations in sense of insecurity in the neighbourhood. Studies in the U.S. and Canada have found contextual effects on fear of crime of about 12 percent (Wyant, 2008; Fitzgerald, 2008) and 11 percent (Taylor, 1997). In comparison, this indicates that the neighbourhood context may play a less significant role in explaining individual differences in Sweden.

Model 2 controls for length of residence and housing type and five indicators of vulnerability and composition. These are immigrant background, sex, age, marital status, and level of education. In accordance with expectations, women show higher levels of worry. Contrary to expectations, those living in multi-family dwellings show lower levels of worry than those living in single-family dwelling, and married or cohabiting persons show higher worry than single persons. Age, immigrant background, level of education, and length of residence do not significantly influence individual-level worry about criminal victimization when sex, housing, and marital status are taken into account.

TABLE 3
Hierarchical regression of worry about criminal victimization (unstandardized regression coefficients).

	Model 1	Model 2	Model 3	Model 4	Model 5
Fixed effects level 1					
Intercept	–0.04 (0.07)ns	–0.07 (0.1) ns	–0.17 (0.09)**	–0.66 (0.08)***	–0.58 (0.07)***
Housing (multi-family dwelling		–0.38 (0.12)**	–0.19 (0.09)**	–0.13 (0.09) ns	0.03 (0.08) ns
Immigrant background		–0.06 (0.08) ns	0.07 (0.08) ns	0.00 (0.08) ns	0.09 (0.08) ns
Sex (women)		0.38 (0.06)***	0.39 (0.06)***	0.45 (0.06)***	0.52 (0.05)***
Marital status (single		–0.25 (0.06)***	–0.27 (0.06)***	–0.29 (0.06)***	–0.21 (0.07)**
Length of residence (5 years or more)		0.02 (0.08) ns	0.05 (0.07) ns	0.11 (0.07) ns	0.02 (0.07) ns
Age		–0.00 (0.00) ns	0.00 (0.00) ns	0.00 (0.00)**	0.00 (0.00)***
No university education		0.12 (0.09) ns	–0.11 (0.09) ns	–0.02 (0.08) ns	–0.09 (0.08) ns
Victimization				1.23 (0.06)***	1.01 (0.06)***
Perceived disorder					0.17 (0.01)***
Level 2					
Neighbourhood disorder			0.24 (0.02)***	0.21 (0.02)***	0.07 (0.02)**
Random effects					
Neighbourhood	0.28**	0.22**	0.03**	0.03**	0.03**
Individual	4.32	4.30	4.30	3.99	3.50
Deviance	18,977	16,856	16,793	16,506	15,289
ICC	5.7%	4.9%	0.8%	0.6%	0.8%

*** < 0.01; ** < 0.05; SE in parentheses

The findings confirm that vulnerability and composition are an important part of the explanation of differences in worry about criminal victimization across neighbourhoods. Put differently, people with characteristics associated with a higher worry about criminal victimization (vulnerability) tend to live in certain neighbourhoods. Adjusting for person-level variables, unexplained variance nonetheless remains (4.9%), indicating that there are true contextual effects that cannot be explained by composition.

Model 3, Table 3, investigates whether neighbourhood disorder has a direct effect on worry about criminal victimization. We control for composition in order to isolate the effect of context on individual-level worry about criminal victimization. The large reduction in the intra-class coefficient supports the contention that neighbourhood disorder is an important mechanism delivering neighbourhood effects. The inclusion of neighbourhood disorder does not alter the effects of the individual-level variables on worry about criminal victimization. The model accounts for 88.5 percent of the variability across the 79 neighbourhoods.

The suggested theoretical model proposes that prior victimization is a mediator of the effect of neighbourhood disorder. We assessed the relationship between neighbourhood disorder, prior victimization and worry about criminal victimization by adding prior victimization in Model 4. We find that the effect of neighbourhood disorder is only marginally reduced but there is a significant effect of prior victimization on worry about criminal victimization. Thus the hypothesis concerning the moderating effect of prior victimization is offered limited support.

In the last step of the analysis we asked whether perceived disorder could be regarded as a mediator of the effect of neighbourhood disorder on worry about criminal victimization, as was proposed in the theoretical model. In order to examine this relationship, perceived disorder was added in Model 5. The findings confirm that perceived disorder influences worry about criminal victimization. Adjusting for perceived disorder at the individual level significantly reduces the coefficient for neighbourhood disorder (from 0.21 to 0.07), although the latter remains significant. This offers some evidence of an indirect effect of neighbourhood disorder via perceived disorder[12]. Moreover, perceived disorder mediates the effect of prior victimization on worry about criminal victimization. Thus some of the effect of prior victimization observed in Model 4 is spurious as a result of its relationship with perceived disorder. Put differently, prior victimization experiences bring about higher perceived disorder. Only 0.8 percent of the neighbourhood-level variance is left unexplained in the final model[13].

DISCUSSION AND CONCLUSION

The results suggest that neighbourhood disorder is an important contextual predictor of individual worry about criminal victimization. With a few exceptions research on neighbourhood effects on fear of crime in contemporary Sweden has been limited to a single level of analysis and has often applied a global, single item measure of fear and proxies thereof. This study has attempted to address the shortcomings of previous research by applying hierarchical regression analysis and a crime-specific composite measure of individual worry about victimization.

By and large, the empirical analyses corroborate the hypotheses. First of all, neighbourhood disorder is found to have an independent effect on worry about criminal victimization. This effect is partially mediated by perceived disorder. Perceived disorder slightly mediates the effect of prior victimization and has a strong independent effect on worry about criminal victimization.

Approximately six percent of the variation in worry about criminal victimization that cannot be attributed by compositional effects can be explained at the neighbourhood level. This finding highlights the importance of the neighbourhood milieu for individual everyday life. It seems that the neighbourhood context sets the stage for individual victimization, perceptions of disorder, and worry about criminal victimization, in Sweden as in other countries.

The findings further suggest that it is important to consider both individuals and settings (and their characteristics) in explaining individual differences in worry about criminal victimization in a contemporary urban Swedish context. In accordance with expectations, most variance is found at the individual level, within neighbourhoods and between residents, but a unique contextual effect is nonetheless evident. The magnitude of the contextual effects found here seem to differ by country. U.S. studies for example have shown stronger neighbourhood level effects than this Swedish study, and that finding is worth studying on its own. We must bear in mind the qualitatively and quantitatively different crime and disorder problems that characterise Swedish and U.S. contexts respectively, and also the differences that exist in relation to different ethnic, social, and economic segregation characteristics. There is a potential danger in relying too much on international research findings when developing national prevention strategies and for this reason we would like to conclude by encouraging researchers to test theoretical arguments in smaller European settings.

The results from this study show that it is worth considering investing in the reduction of neighbourhood disorder when attempting to reduce differences in peoples' worry about criminal victimization. It can further be argued that in order to achieve their maximum effect, prevention strategies should consider targeting both people and places. Wyant (2008) also suggests that prevention strategies should take account of the situation in, and impact of, adjoining neighbourhoods. People's worry about criminal victimization may be influenced by the structure and level of disorder in adjacent areas. This is called spatial dependency (Anselin *et al.*, 2000) and future studies should consider including a measure of the adjacent neighbourhoods' disorder levels.

Although the results of the present study have value in their own right, the results should be considered as having some limitations. Since this study is cross-sectional, no conclusions can be drawn regarding causality and we would therefore encourage scholars to apply a longitudinal research design to the study of neighbourhood effects on fear of crime. Conclusions from this study only apply to the subconcept of fear of crime measured here, worry about criminal victimization, and findings should not be generalised to the umbrella concept 'fear of crime'.

Administrative areas and their borders are not always congruent with residents' perceptions of their exact neighbourhood. Therefore the results may be affected by the definition of neighbourhoods as small geographical areas. In the present study, a neighbourhood level measure of disorder was created based on a perceptual measure. Scholars should also consider testing the proposed model with independent measures of disorder, such as key informants (Pauwels and Hardyns, 2009) and systematic social observations of disorder (Sampson and Raudenbush, 1999).

NOTES

1. Worry about criminal victimization is measured as a cognitive dimension of fear of crime. It is important to notice that worry refers to criminal victimization in one's own residential area.
2. Recent studies of the crime–disorder link at the neighbourhood level have produced contradictory evidence, which has lead to a rethinking of disorder (Skogan, 1990; Perkins and Taylor, 1996; Taylor, 1997; 1999; 2001; Taylor and Covington, 1993). 'Broken windows' theory states that disorder has a direct and independent effect on crime and fear of crime. Another line of research instead argues that rather than directly causing crime, disorder is part of the same phenomenon as crime and shares the same causes. The posited underlying mechanism takes the form of a neighbourhood level social control process labelled collective efficacy. Sampson and Raudenbush (1999) define collective efficacy as 'the shared willingness of local residents to intervene for the common good' (Sampson and Raudenbush, 1999: p. 612). The common-cause hypothesis was not supported when tested in Antwerp, Belgium and Malmo, Sweden (Mellgren *et al.*, 2010).
3. Controversial because of its harsh policy interpretation by introducing zero tolerance policing and 'three strikes and you're out' strategies. However, in the present article we are only concerned with the theoretical statements about theories of disorder, and leave the policy implication of how to prevent disorder to evaluation studies. The present study tests a model that explains individual differences in worry about criminal victimization and points at the mechanisms that are involved, so as to increase our knowledge about the causes of individual differences in worry about criminal victimization.
4. We assessed the ecological reliability of our neighbourhood measure of disorder when using only 20 respondents per neighbourhood and found the ecological reliability to be satisfactory.

5. The dependent variable is actually an ordinal variable. We are aware of the potential problems of treating an ordinal-scale variable as continuous (e.g. the differences between answer alternatives are not equal). however, it is a common procedure to treat ordinal-scale variables as interval-scale and it has been shown empirically to matter little (Knapp, 1990).
6. Vulnerability is a complex task to measure. One shortcoming of this study is that we use background variables as proxies for vulnerability since we were not able to measure vulnerability as a separate concept. Therefore results should be interpreted with care.
7. There are numerous indicators of neighbourhood socio-economic and demographic composition. We recognise that we have only been able to include a limited number of possible indicators, all of which have been found to be related to fear of crime.
8. Race is not a useful concept in a Swedish context; instead we talk about immigrants and foreign-born status. The population of Malmo is very heterogeneous and altogether the residents of Malmo speak 100 languages and belong to 164 different nationalities. We recognise that the group classified as 'foreign' in this study is heterogeneous and that the use of this term involves a risk of generalisation. We argue, however, that people with at least one foreign born parent constitute a discriminated and disadvantaged group. Sampson and Wikström (2008), when comparing America and Sweden, talk about out-group status in each country as an important concept. Svensson and Pauwels (2008) use the same definition of immigrant background when studying lifestyle risk and offending in Halmstad, Sweden.
9. The response alternatives 'not present' and 'don't know' were collapsed into a single response category as one can argue that those that do not know, do not perceive it.
10. The use of averages of individual level measures has been the subject of criticism in multilevel studies, but in the present study there was no alternative measure of neighbourhood disorder. Perkins and Taylor (1996) compared aggregated survey measures of perceived disorder with on-site observed disorder and a content analysis of crime- and disorder-related newspaper articles. They found that the three different measures of neighbourhood level disorder were roughly equally able to predict fear of crime among residents and that the measures were ecologically reliable. A similar measure to the one used in this study has been used in several contemporary studies of contextual influences on individual fear (e.g. Wyant, 2008). This supports the use of aggregated survey measures of disorder as an ecological measure of disorder.
11. But even in that case of selection, the selection effect in itself is worth studying to increase our knowledge of ecological social processes (see Sampson and Sharkey, 2008 for a thorough discussion). Selection should not only be seen as a nuisance, it should be thoroughly studied to increase insight into the consequences of segregation and selection at multiple moments in time. What has previously been detected as a selection effect may eventually develop or generate other contextual effects.
12. The analyses conducted demonstrate that perceived disorder mediates the effect of neighbourhood disorder. This suggests that neighbourhood level disorder has a rather indirect effect on worry about criminal victimization. We

did not test such indirect effects by structural equation models, but additionally ran models in which perceived disorder was considered as the dependent variable. This model is not shown here but confirms direct effects of neighbourhood level disorder on perceived disorder. Further studies should definitely take the issue of direct and indirect effects into account.

13. To further test the robustness of our results we replicated Model 4 but with police recorded violent crime rate as the neighbourhood level predictor. The results were highly similar and this further establishes neighbourhood context as important for individual worry about criminal victimization.

REFERENCES

Adams, R.E. and Serpe, R.T. (2000). Social Integration, Fear of Crime, and Life Satisfaction. *Sociological Perspectives,* **4**, 605–629.

Anselin, L., Cohen, J., Cook, D., Gorr, W. and Tita, G. (2000). Spatial Analyses of Crime. *Criminal Justice: Measurement and Analysis of Crime and Justice*, **4**, 213–262.

Chandola, T. (2001). The Fear of Crime and Area Differences in Health. *Health and Place*, **7**, 105–116.

Covington, J. and Taylor, R.B. (1991). Fear of Crime in Urban Residential Neighbourhoods: Implications of Between- and Within-neighbourhood Sources for Current Models. *The Sociological Quarterly,***32**, 231–249.

Curtis, S. and Jones, I.R. (1998). Is There a Place for Geography in the Analysis of Health Inequalities? *Sociology of Health and Illness*, **20**, 645–672.

Ditton, J. and Farrall, S. (eds) (2000). *The Fear of Crime*. Ashgate; Aldershot.

Dolmén, L. (2002). *Brottslighetens Geograft — en Analys av Brottsligheten i Stockholms Län.* Avhandlingsserie Nr 6. Kriminologiska Institutionen; Stockholms Universitet.

Ericksson, K. (2008). *Otrygghet och Segregation. Bostadsområdets Betydelse för Allmänhetens Otrygghet och Oro för Brott*. Brottsförebyggande rådat. Rapport 2008; 16.

Estrada, F. and Nilsson, A. (2008). Segregation and Victimization: Neighbourhood Resources, Individual Risk Factors and Exposure to Property Crime. *European Journal of Criminology,* **5**, 193–216.

Ferraro, K.F. (1995). *Fear of Crime: Interpreting Victimization Risk*. State University of New York Press; Albany.

Ferraro, K.F. and LaGrange, R. (1987). The Measurement of Fear of Crime. *Sociological Inquiry*, **57**, 70–101.

Fitzgerald, R. (2008). *Fear of Crime and the Neighbourhood Context in Canadian Cities*. Crime and Justice Research Paper. Statistics Canada.

Franklin, T.W., Franklin, C.A. and Fearn, N.E. (2008). A Multilevel Analysis of the Vulnerability, Disorder, and Social Integration Models of Fear of Crime. *Social Justice Research*, **21**, 204–227.

Furstenberg, F.F. (1971). Public Reaction to Crime in the Streets. *The American Scholar*, **40**, 601–610.

Garofalo, J. (1981). The Fear of Crime: Causes and Consequences. *Journal of Criminal Law and Criminology*, **72**, 839–857.

Hale, C. (1996). Fear of Crime: a Review of the Literature. *International Review of Victimology,* 4, 79–150.

Knapp, T.R. (1990). Treating Ordinal Scales as Interval Scales: An Attempt to Resolve the Controversy. *Nursing Research*, **2**, 121–123.

Junger, M. (1987). Women's Experience of Sexual Harassment. Some Implications for their Fear of Crime. *British Journal of Criminology*, **27**, 358–383.

LaGrange, R.L., Ferraro, K.F. and Supancic, M. (1992). Perceived Risk and Fear of Crime: Role of Social and Physical Incivilities. *Journal of Research in Crime and Delinquency*, **29**, 311–334.

Lewis, D.A. and Salem, G.W. (1986). *Fear of Crime: Incivility and the Production of a Social Problem*. Transaction Books; New Brunswick.

Lindström, M., Merlo, J. and Östergren, P-O. (2003). Social Capital and Sense of Insecurity in the Neighbourhood: a Population-based Multilevel Analysis in Malmo, Sweden. *Social Science and Medicine*, **56**, 1111–1120.

Litzén, S. (2006). *Oro för Brott i Urban Miljö. Trygghetsundersökningar med Anknytning till Stockholm.* Kriminologiska Institutionen; Stockholms Universitet.

McCord, S., Ratcliffe, J.H., Garcia, R.M. and Taylor, R.B. (2007). Non-residential Crime Attractors and Generators Elevate Perceived Neighborhood Crime and Incivilities. *Journal of Research in Crime and Delinquency,* **44**, 295–320.

Mellgren, C., Pauwels, L. and Torstensson Levander, M. (2010). Population Density, Disadvantage, Disorder and Crime. Testing Competing Neighbourhood Level Theories in Two Urban Settings. In *Safety, Societal Problems and Citizens' Perceptions. New Empirical Data, Theories and Analyses* (M. Cools, B. De Ruyver, M. Easton, G. Vande Walle and F. Vander Laenen, eds) pp. 183–200. Governance of Security Research Paper Series (GofS), Volume 3. Antwerpen, Maklu.

Pain, R. (2000). Place, Social Relations and the Fear of Crime: A Review. *Progress in Human Geography*, **24**, 365–387.

Pauwels, L. and Hardyns, W. (2009). Measuring Community (Dis)organizational Processes through Key-informant Analysis. *European Journal of Criminology*, **5**, 401–417.

Perkins, D.D. and Taylor, R.B. (1996). Ecological Assessment of Community Disorder: Their Relationship to Fear of Crime and Theoretical Implications. *American Journal of Community Psychology*, **1**, 63–107.

Raudenbush, S., Bryk, A., Cheong, Y. and Congdon, P. (2004). *HLM 6: Hierarchical Linear and Nonlinear Modeling*. Scientific Software International.

Raudenbush, S. and Sampson, R.J. (1999). Ecometrics: Toward a Science of Assessing Ecological Settings, with Application to the Systematic Social Observation of Neighborhoods. *Sociological Methodology,* **29,** 1–41.

Sampson, R.J. (2003). The Neighborhood Context of Well-being. *Perspectives in Biology and Medicine*, **46**, Supplement, 553–564.

Sampson, R.J. and Raudenbush, S. (1999). Systematic Social Observation of Public Spaces: a New Look at Disorder in Urban Neighborhoods. *American Journal of Sociology*, **105**, 603–651.

Sampson, R.J. and Raudenbush, S. (2004). Seeing Disorder: Neighbourhood Stigma and the Social Construction of 'Broken Windows'. *Social Psychology Quarterly,* **67**, 319–342.

Sampson, R.J., Raudenbush, S. and Earls, F. (1997). Neighborhoods and Violent Crime: a Multilevel Study of Collective Efficacy. *Science*, **277**, 918–924.

Sampson, R.J. and Sharkey, P. (2008). Neighborhood Selection and the Social Reproduction of Concentrated Racial Inequality. *Demography*, **45**, 1–29.

Sampson, R.J. and Wikström, P-O.H. (2008). The Social Order of Violence in Chicago and Stockholm Neighbourhoods: a Comparative Inquiry. In *Order, Conflict, and Violence* (S.N. Kalyvas, I. Shapirom and T. Masoudm, eds) pp. 97–119. Cambridge University Press; New York and Cambridge.

Sellström, E. and Bremberg, S. (2006). The Significance of Neighbourhood Context to Child and Adolescent Health and Well-being: A Systematic Review of Multilevel Studies. *Scandinavian Journal of Public Health*, **34**, 544–554.

Shaw, C.R. and McKay, H.D. (1942). *Juvenile Delinquency in Urban Areas*. University of Chicago Press; Chicago.

Skogan, W. (1990). *Disorder and Decline: Crime and the Spiral of Decay in American Cities.* University of California Press; Berkley.

Skogan, W.G. and Maxfield, M.G. (1981). *Coping with Crime*. Sage; Beverly Hills, CA.

Smith, W. and Torstensson, M. (1997). Gender Differences in Risk Perception and Neutralizing Fear of Crime: Toward Resolving the Paradoxes. *British Journal of Criminology,* **37**, 608–634.

Snijders, T.A.B. and Bosker, R.J. (2004). Multilevel Analysis: an Introduction to Basic and Advanced Multilevel Modelling. Sage; Thousand Oaks, CA.

Subramanian, S.V., Jones, K. and Duncan, C. (2003). Multilevel Methods for Public Health Research. In *Neighborhoods and Health* (I. Kawachi and L.F. Berkman, eds) pp. 65–111. Oxford University Press; New York.

Svensson, R. and Pauwels, L. (2008). Is a Risky Lifestyle always 'Risky'? The Interaction between Individual Propensity and Lifestyle Risk in Adolescent Offending. A Test in Two Urban Samples. *Crime and Delinquency*. Prepublished September 24, 2008.

Taylor, R.B. (1996). Neighborhood Responses to Disorder and Local Attachments: the Systemic Model of Attachment, Social Disorganization, and Neighborhood Use Value. *Sociological Forum*, **11**, 41–74.

Taylor, R.B. (1997). Social Order and Disorder of Street Blocks and Neighborhoods: Ecology, Microecology, and the Systemic Model of Social Disorganization. *Journal of Research in Crime and Delinquency*, **34**, 113–155.

Taylor, R.B. (1999). The Incivilities Thesis: Theory, Measurement, and Policy. In *Measuring What Matters* (R.H. Langworthy, ed.) pp. 65–88. National Institute of Justice: Washington, D.C.

Taylor, R.B. (2001). *Breaking Away from Broken Windows: Baltimore Neighborhoods and the National Fight against Crime, Grime, Fear, and Decline.* Westview; Boulder, CO.

Taylor, R.B. and Covington, J. (1993). Community Structural Change and Fear of Crime. *Social Problems*, **40**, 374–397.

Torstensson, M. (1999). Lokala Problem, Brott och Trygghet i Polisområde Malmö — 1998 års Trygghetsmätning. Polishögskolan och Avdelningen för Psykiatri. Lunds Universitet; Malmö.

Warr, M. (1984). Fear of Victimization: Why are Women and the Elderly more Afraid? *Social Science Quarterly*, **65**, 681–702.

Wikström, P-O.H. (1991). *Urban Crime, Criminals and Victims: the Swedish Experience in an Anglo-American Perspective.* Springer Verlag; New York.

Wikström, P-O.H. and Dolmén, L. (2001). Urbanisation, Neighbourhood Social Integration, Informal Social Control, Minor Social Disorder, Victimization and Fear of Crime. *International Review of Victimology*, **8**, 121–140.

Wikström, P-O.H. and Sampson, R.J. (2003). Social Mechanisms of Community Influences on Crime and Pathways in Criminality. In *Causes of Conduct Disorder and Serious Juvenile Delinquency* (B. Lahey, T.J. Moffitt and A. Caspi, eds) pp. 118–148. Guilford Press; New York.

Wilson, J.Q. and Kelling, G.L. (1982). Broken Windows. *Atlantic Monthly*. March, 29–38.

Wyant, R.B. (2008). Multilevel Impacts of Perceived Incivilities and Perceptions of Crime Risk on Fear of Crime: Isolating Endogenous Impacts. *Journal of Research in Crime and Delinquency*, **45**, 39–64.