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*Published in:*  
European Journal of Criminology

*DOI:*  
[10.1177/1477370807071731](https://doi.org/10.1177/1477370807071731)

**IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.**

*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
2007

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Weijters, G., Scheepers, P., & Gerris, J. (2007). Distinguishing the City, Neighbourhood and Individual Level in the Explanation of Youth Delinquency. *European Journal of Criminology*, 4(1), 87. DOI: 10.1177/1477370807071731

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## **Distinguishing the City, Neighbourhood and Individual Level in the Explanation of Youth Delinquency: A Multilevel Approach**

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*European Journal of Criminology* 2007; 4; 87  
DOI: 10.1177/1477370807071731

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# Distinguishing the City, Neighbourhood and Individual Level in the Explanation of Youth Delinquency

## A Multilevel Approach

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### ABSTRACT

Previous research on intercity differences in crime rates neglects individual determinants of youth delinquency, whereas studies focusing on neighbourhood- and individual-level explanations of youth delinquency neglect higher-level, city characteristics. This raises the question of the extent to which city characteristics can contribute to the explanation of youth delinquency, above and beyond the influence of neighbourhood and individual characteristics. To answer this question we first discuss how previous macro-level research explains city differences in crime rates, and then we test whether there is empirical evidence that youth delinquency differs not only between individuals but also between neighbourhoods and, moreover, between cities. Using data collected among 12–17-year-old adolescents from 11 Dutch cities, multilevel analyses revealed that there is a substantial amount of variance to be explained at the city level, even after controlling for composition effects and differences between surveys. In contrast with previous research studying neighbourhood influences on youth delinquency but neglecting the city level, we found very little variance at the neighbourhood level. Possible explanations and implications for future research are given by linking explanations at the different levels.

**KEY WORDS**

City Differences / Contextual Effects / Multilevel Analysis / Youth Delinquency.

**Introduction**

In criminological research there is great interest in the study of macro-level crime rates. In the United States in particular, differences in crime rates between cities have received attention in various studies (e.g. Blau and Blau 1982; Miethe et al. 1991; Shihadeh and Steffensmeier 1994; Shihadeh and Flynn 1996; Krivo and Peterson 2000; Parker 2001; Velez et al. 2003). Using macro-level theories, these researchers propose how city differences in crime rates can be explained. However, these studies neglect individual determinants of individual delinquency. Hence, when in macro-level research city characteristics affect city-level crime rates, it is assumed, but not tested, that these city characteristics influence individual levels of crime. This raises the question of whether macro-level predictors (i.e. city characteristics) have separate effects on individual levels of crime, controlling for the influence of other relevant factors, for example, individual determinants and composition effects.

A number of investigations have been done at a city level and focus on the neighbourhood and/or individual level. The characteristics of some of the better-known studies in the USA and Europe will be discussed. For the USA, these projects are the Denver Youth Survey (DYS), the Rochester Youth Development Study (RYDS), the Pittsburgh Youth Study (PYS) and the Project on Human Development in Chicago Neighbourhoods (PHDCN).<sup>1</sup> In Europe, three of these projects are the Peterborough Youth Study (PBYS), the German project 'Social Problems and Juvenile Delinquency in an Ecological Perspective' (SPJDEP) and the Edinburgh Study of Youth Transitions and Crime (ESYTC).<sup>2</sup> All of these projects aim to provide better insights into the determinants of youth delinquency, but focus on different levels. The DHS, the RYDS and the PYS are longitudinal programmes studying adolescent development and delinquent behaviour.

<sup>1</sup> For further information on the DHS, see Huizinga et al. (1991), Browning and Huizinga (1999) and Thornberry and Krohn (2003). More information on the RYDS can be found in Thornberry et al. (1991), Browning et al. (1999) and Thornberry and Krohn (2003). The PYS is described more thoroughly in Loeber et al. (1991), Browning and Loeber (1999) and Thornberry and Krohn (2003). For further information on the PHDCN, visit <http://www.hms.harvard.edu/chase/projects/chicago/about/>.

<sup>2</sup> Further reading on the PBYS can be found in Wikström (2003). More information on the SPJDEP is found on [http://www.iuscrim.mpg.de/forsch/krim/oberwittler1\\_e.html](http://www.iuscrim.mpg.de/forsch/krim/oberwittler1_e.html). For further information on the ESYTC, see Smith and McVie (2003).

These projects use a sample in which adolescents at risk are overrepresented. The main interest is to study individual characteristics, both psychological characteristics and characteristics related to family, peers and school. The PHDCN and SPJDEP also study individual determinants of youth delinquency, but the interest of these researches is more on the influence of neighbourhood characteristics on delinquency. Hence, these projects' main focus is the neighbourhood level. The PBYS and the ESYTC concentrate on both individual and neighbourhood determinants of delinquency. Their emphasis is more evenly divided between the individual level and the neighbourhood level, although with the disadvantage that they cannot test whether determinants at higher levels, for example, the city level, influence youth delinquency. This is particularly disadvantageous because it is questionable whether findings from single-city studies can be generalized to the situation in other cities (Rountree and Land 2000). Thus these studies cannot provide an answer to the question of whether city characteristics affect youth delinquency above and beyond the influence of neighbourhood and individual characteristics.

Whereas studies attempting to explain differences in crime rates between cities neglect neighbourhood and individual characteristics, research on individual rates of crime and delinquency neglects the influence of higher-level characteristics, such as city characteristics. The main aim in this paper is to explore whether there is evidence, both theoretical and empirical, to distinguish the city level as a context for the explanation of youth delinquency, along with the neighbourhood level and the individual level. To accomplish this, we will first discuss macro-level theories of crime and delinquency. We will present findings from previous research that suggest that city characteristics explain intercity differences in crime rates. Secondly, we will test whether there is empirical evidence to distinguish the city as a social context influencing youth delinquency above and beyond influences of neighbourhood and individual factors. We estimate the amount of variance at the city, neighbourhood and individual levels using multilevel analysis, while controlling for composition and methodological effects. To investigate the variance at different levels, data from different Dutch cities are compiled, thus making intercity comparisons possible. To our knowledge this intercity perspective has not been used in previous research.

## **Macro-level theories of crime and delinquency**

Various researchers have studied community differences in crime rates. The two main theoretical approaches of these studies are social stratification and social control (Ousey 2000).

The social stratification perspective implies that crime relates to economic conditions: communities with high crime rates tend to be low in economic status (Agnew 1999). The main perspectives of this approach are the absolute deprivation model and the relative deprivation model. According to the absolute deprivation model, crime is more likely to prevail in communities with low income levels (Ousey 2000). Thus, absolute deprivation theory assumes implicitly that, in communities with low income levels, crime is less readily rejected as a means of satisfying one's needs. The relative deprivation model focuses on the effect of income inequality on community crime rates instead of the effect of absolute levels of poverty. The rationale behind this approach is that income inequality undermines the social integration of communities by widening the gaps between different (income) groups, which can generate strain or frustration, which in turn increases crime (Agnew 1999).

The social control perspective implies that a lack of social integration in communities decreases informal social control in these areas, which in turn increases crime rates in these communities. This perspective has been derived from the social disorganization theory developed by Shaw and McKay ([1942]1969). Shaw and McKay tried to explain why crime rates differed between neighbourhoods. They found particular neighbourhood characteristics and crime rates to be related. Neighbourhoods characterized by high residential mobility, by ethnic heterogeneity and by a low economic status exhibited higher crime rates. Shaw and McKay explained this finding by proposing that neighbourhoods with these characteristics are characterized by community disruption, which implies a low degree of social cohesion, which can be identified by low social control and weak social networks.

### **Previous research on city differences in crime rates**

Surprisingly, studies on intercity differences in crime rates have not yet integrated explanations derived from lower levels than the city level in their research. The stratification approach is the dominant perspective in most studies on city differences in crime rates. Blau and Blau (1982) showed that the absolute poverty level in a city has no influence on violent crime, after controlling for the city's income inequality. Their results thus support the relative deprivation thesis. These results were confirmed by Logan and Messner (1987), who found that poverty inequality has a positive effect on a city's violent crime rate. Balkwell (1990) found support for both the absolute and the relative deprivation theses. His results showed that both absolute poverty and income inequality, measured at city level, affect city crime rates. In their research on the influence of different macro-level

determinants of homicide, Land et al. (1990) found that resource deprivation – as measured by community measures of median income level, income inequality, percentage of families below the poverty line, percentage of blacks and percentage of one-parent families – showed a significant relationship with homicide rates. The more deprived a community, the higher the crime rate.

Previous research has also shown evidence supporting social disorganization theory. Miethe et al. (1991) found an influence of determinants derived from social disorganization theory on official crime rates in US cities. The more ethnically heterogeneous and the less institutionally controlled a city, the higher the city's level of crime. Another explanation for city differences in crime rates is the level of segregation in a city. Shihadeh and Flynn (1996) showed that the level of black segregation in a city significantly affects city levels of serious black violence rates. Parker (2001) showed that city-level segregation affects city-level homicide rates both for blacks and for whites. In their paper on differences in homicide offending between blacks and whites in US cities, Velez et al. (2003) found that, in cities where residential segregation is higher, blacks have much higher levels of homicide offending than do whites.

### **Previous research on neighbourhood differences in crime rates**

Various researchers tested elements of Shaw and McKay's propositions that neighbourhood characteristics such as high residential mobility, ethnic heterogeneity and low economic status directly affect the likelihood of its residents committing crimes (e.g. Sampson and Groves 1989; Peeples and Loeber 1994; Sampson et al. 1997; Wittebrood 2000; Beyers et al. 2001). Most of these studies took individual as well as neighbourhood characteristics into account. Wittebrood (2000) showed that individuals in neighbourhoods with low economic status, high ethnic heterogeneity and high residential mobility are more likely to become victims of violent crime. Beyers et al. (2001) showed that neighbourhood disadvantage reinforces boys' violent delinquency. Their measure of neighbourhood disadvantage is constructed by using six indicators: percentage of families with children headed by single parents, median household income, percentage of families below the poverty level, percentage of households on public assistance, percentage unemployed and percentage of African Americans. Peeples and Loeber (1994) found the same in their research on the seriousness and frequency of adolescent boys' delinquency. Schneiders et al. (2003) investigated to what extent neighbourhood disadvantage contributes to children's behavioural and emotional problems, and found support for the findings of Beyers et al. (2001). Sampson and Groves

(1989) found only ethnic heterogeneity to have a direct effect on the offence rate. Sampson et al. (1997) showed direct effects of neighbourhood characteristics, concentrated disadvantage, immigrant concentration and lack of residential stability on rates of violence. In contrast to the previous findings, Rovers (1997) did not find any influence of neighbourhood deprivation or an effect of a lack of social control in the neighbourhood on the criminal behaviour of juveniles.

In the previous sections we have shown which characteristics at city and neighbourhood level might have an influence on youth delinquency. We conclude that there are ample reasons to consider variance in youth delinquency at different levels, that is, city, neighbourhood and individual level. However, testing for the amount of variance at different levels simultaneously has not been systematically done as yet. In the remainder of this paper we will take a first step in analysing variance in youth delinquency at these three different levels simultaneously. To avoid the possibility that city and neighbourhood differences are the result of methodological artefacts, we control in the analyses for composition and survey effects. In the following sections we explicate the way in which population composition and survey characteristics can explain differences in youth delinquency between cities and neighbourhoods.

### **Intercity and inter-neighbourhood differences owing to composition effects**

An alternative demographic explanation for differences in the extent of youth delinquency between cities and between neighbourhoods could be that the population composition differs between cities and between neighbourhoods. Cities and neighbourhoods with higher numbers of youngsters, who are more likely to commit crimes, show a higher prevalence of youth delinquency. Demographic characteristics correlating with delinquency, and which presumably differ between cities and between neighbourhoods, are ethnicity, educational level and home situation. Previous research has shown that adolescents from an ethnic minority background (Junger and Haen Marshall 1997) and adolescents with lower levels of schooling (Williams et al. 1999; Hansen 2003) or living with only one parent (Sampson and Laub 1994; Anderson 2002) are more likely to engage in delinquent behaviour. There is ample evidence that boys commit more crimes than girls (see, for example, Rhodes and Fischer 1993; Steffensmeier and Allan 1996; Piquero et al. 2005) and that delinquency rises sharply during adolescence, with a peak at about age 17 (Moffitt 1993). Thus, with regard to our research questions, we test to what extent differences in population



composition with regard to ethnicity, educational level, home situation, gender and age explain city and neighbourhood differences in youth delinquency. We expect that these composition effects explain city and neighbourhood differences to some extent, but that variance at the city level and the neighbourhood level still remains to be explained.

## Intercity differences owing to different methods of data collection

Most research on youth delinquency uses self-report measures. Self-report measures are preferred to police statistics because the latter tend to under-report actual delinquency. Another disadvantage of police statistics is that less serious crimes are not included. A disadvantage of self-reported delinquency, however, is that its validity depends to some extent on the way the questionnaire is administered. The level of privacy affects the measurement of sensitive behaviour such as delinquency (Turner et al. 1998). Naplava and Oberwittler (2002) found large differences in reported delinquency between face-to-face interviews at the respondent's home and questionnaires filled in at school in class. Adolescents reported delinquency more often in school-based surveys than in home-based surveys. Naplava and Oberwittler explain these differences, first, by the fact that the response rate of home-based surveys is usually lower than the response rate of school-based surveys. This selection effect is less marked in school-based surveys, although it cannot be eliminated entirely. School-based surveys exclude school dropouts, except where efforts are made to follow them up outside school. Second, in home-based surveys people feel less anonymous than in class-based interviews. This could imply that people are more likely to give socially desirable answers. At home, in the presence of parents, it would be more appropriate to act more decently. At school, in contrast, in the presence of classmates, it might be 'cool' to overact. In our research, we will test for differences in data collection and we hypothesize that cities where data have been collected in classes at schools exhibit a higher extent of youth delinquency than cities where data have been collected by mail questionnaires, that is, a questionnaire sent to the respondent's home.<sup>3</sup>

<sup>3</sup> Differences between cities in the extent of youth delinquency could also be owing to sampling effects. In the city projects described, not all cities use representative samples of the studied city. For example, the PYS samples only boys (Loeber et al. 1991; Browning and Loeber 1999; Thornberry and Krohn 2003), the RYDS uses a sample of high-risk adolescents (Thornberry et al. 1991; Browning et al. 1999; Thornberry and Krohn 2003) and the DYS takes a sample from adolescents living in high-risk neighbourhoods (Huizinga et al. 1991; Browning and Huizinga 1999; Thornberry and Krohn 2003). By sampling or overrepresenting

## Data

For the purpose of this research we compiled data from 11 cities in the Netherlands. These were all cities available and comparable for the purpose of this paper: to estimate the amount of variance in youth delinquency at city level, neighbourhood level and individual level. From 1998, these cities carried out at least one youth survey. The purpose of such surveys was to describe the circumstances and lifestyles of adolescents. All of the surveys are based upon the Dutch Standard Youth Monitor (Bijmold et al. 1998), which optimizes the comparability of the surveys. In every city adolescents were questioned about their (risk) behaviour (such as drinking, drug use and delinquency), their home situation and relations with their care-takers, peer relations and background characteristics (such as age, ethnicity and gender). Data collection and sampling methods were not the same for all of the cities. Some cities put together a sample of all youth living in the particular city; other cities sampled schools, where they administered the questionnaires in class. This latter method means that the adolescents questioned comprised not only those living in the particular city but also those living in localities nearby. Table 1 gives an overview of some relevant characteristics of the different data sets. For this research we selected adolescents from the different data sets, taking only those aged 12–17 who lived in one of the cities.

As stipulated in Table 1, all cities asked for a list of delinquent acts, whether or not the adolescent had committed that act over the previous 12 months. Some cities also asked how often these offences had been committed in the past year. However, because not all cities asked about frequency, we cannot use this information in the present analysis. Six delinquent acts were covered in all 11 cities. Hence we will use these six acts to measure youth delinquency.

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adolescents at risk (for example, on the basis of the characteristics mentioned above), the overall extent of delinquency is likely to be higher in comparison with taking a representative sample of the city's youth, although it is possible to account for this by weighting the data to reflect the broader population. Another example of the influence of sampling is when schools are being sampled, and consequently students are being questioned. In this way, school dropouts, a group likely to be at risk, are not part of the research group. Our purpose was to control both for sample effects and for effects of the way data were collected. As can be concluded from Table 1, at the city level no variation exists between these characteristics. Cities that randomly sampled adolescents used mail questionnaires sent to the adolescent's home, whereas cities that selected schools to collect the data interviewed the respondents in class. Hence we cannot test both the effect of sampling and the effect of data collection.

**Table 1** Characteristics of the data for the different cities

City	Year of data collection	N	Sample	Data collection	Measurement of delinquency
Almelo	2002	803	Randomly selected adolescents	Written mail questionnaire sent to adolescent's home	Which delinquent acts committed past 12 months – 24 items
Den Bosch	2002	1382	Randomly selected adolescents	Written mail questionnaire sent to adolescent's home	Which delinquent acts committed past 12 months – 12 items
Helmond	2000/2001	1322	Randomly selected adolescents	Written mail questionnaire sent to adolescent's home	Which delinquent acts committed past 12 months – 24 items
Leeuwarden	2001	692	Randomly selected adolescents	Written mail questionnaire sent to adolescent's home	Which delinquent acts committed past 12 months, and how often – 24 items
Nijmegen	1999	1349	Randomly selected adolescents	Written mail questionnaire sent to adolescent's home	Which delinquent acts committed past 12 months – 24 items
Schiedam	2000/2001	668	Randomly selected adolescents	12–16 year olds: partly written mail questionnaire sent to adolescent's home, partly written questionnaire in class at school, 17 year olds written mail questionnaire sent to adolescent's home	Which delinquent acts committed past 12 months – 23 items
Heerlen	2001	1384	All secondary schools selected, students in year 2 and 4 questioned	Written questionnaire in class at school	How often did you commit the following delinquent acts the last 12 months? – 12 items
Maastricht	2001	1906	All secondary schools selected, students in year 2 and 4 questioned	Written questionnaire in class at school	How often did you commit the following delinquent acts the last 12 months? – 12 items

**Table 1** (continued)

Table 1 (continued)

City	Year of data collection	N	Sample	Data collection	Measurement of delinquency
Venlo	2001	1154	All secondary schools selected, students in year 2 and 4 questioned	Written questionnaire in class at school	How often did you commit the following delinquent acts the last 12 months? – 12 items
Sittard-Geleen	2001	1222	All secondary schools selected, students in year 2 and 4 questioned	Written questionnaire in class at school	How often did you commit the following delinquent acts the last 12 months? – 12 items
Rotterdam	Year 1: 1998–1999 Year 3: 2000–2002	5604	All secondary schools selected, students in year 1 and 3 questioned	Written questionnaire in class at school	Which delinquent acts committed past 12 months, and how often Year 1: 23 items Year 3: 15 items

### Operationalization of youth delinquency and the independent variables

Youth delinquency is operationalized by six delinquent acts: theft from shops, vandalism, graffiti, burglary, carrying a weapon, and threatening other persons for money. For each item, respondents were asked whether they had committed this offence in the previous 12 months. In Almelo, Helmond, Leeuwarden, Nijmegen and Schiedam, theft from shops was measured by two items: 'In the last twelve months did you steal something from a shop worth less than 10 guilders (approximately 5 euro)', and 'In the last twelve months did you steal something from a shop worth more than 10 guilders (approximately 5 euro)'. The same holds for vandalism. In those cases where vandalism was measured on the basis of more than one item, adolescents were coded as committing this act when they admitted they had committed at least one of the vandalism acts asked about. For our final analyses we counted the number of delinquent acts committed. In Table 2, the proportion of adolescents who committed a particular delinquent act is given for each city. Generally, for each individual delinquent act it can be seen that most adolescents are not very likely to have committed it. Comparing the relative frequency per offence, a pattern can be distinguished between cities. In every city the same items are committed least: namely burglary and threatening for money. No doubt these are the least common offences because they are the most serious ones. Furthermore Table 2 shows that some variation in youth delinquency exists between different cities.

**Table 2** Proportion who had committed each delinquent act, by city

City	<i>Theft from shops</i>	<i>Vandalism</i>	<i>Graffiti</i>	<i>Burglary</i>	<i>Carrying a weapon</i>	<i>Threatening for money</i>
Almelo	0.03	0.07	0.02	0.01	0.03	0.00
Den Bosch	0.04	0.03	0.04	0.01	0.02	0.00
Helmond	0.02	0.05	0.03	0.01	0.02	0.00
Leeuwarden	0.08	0.16	0.07	0.01	0.04	0.00
Nijmegen	0.09	0.14	0.10	0.02	0.08	0.01
Schiedam	0.04	0.09	0.05	0.01	0.03	0.01
Heerlen	0.13	0.17	0.06	0.03	0.16	0.04
Maastricht	0.13	0.13	0.05	0.01	0.09	0.02
Venlo	0.08	0.11	0.07	0.01	0.10	0.02
Sittard-Geleen	0.12	0.12	0.05	0.01	0.10	0.02
Rotterdam	0.20	0.12	0.19	0.04	0.20	0.03
Total	0.13	0.12	0.10	0.02	0.13	0.02

To test whether differences between cities and neighbourhoods are the result of composition effects, we take account of individual characteristics that previous research has shown to be significantly related to youth delinquency.<sup>4</sup> When such characteristics are disproportionately present in a city or neighbourhood, this could explain why these cities or neighbourhoods show higher levels of youth delinquency. The variables we control for are ethnicity, educational level, home situation, gender and age. Six categories – Dutch, Surinamese/Antillean, Turkish, Moroccan, mixed and other groups – represent ethnicity. This measure is based upon the country in which the adolescent's parents were born. When both parents were born in the same country, the adolescent is placed in that particular category. The 'mixed' category contains adolescents with one parent born in the Netherlands and the other abroad. Adolescents are placed in the 'other groups' category when their parents were born in different countries, neither being the Netherlands, or in the same country but other than those listed above. Given the Dutch situation, ideally we would like to distinguish between Surinamese and Antilleans,<sup>5</sup> but because not all cities made this distinction it is not possible to do so. Educational level represents the level of education the adolescent was following at the time of the interview. The categories of educational level are: primary school, lower secondary, higher secondary, other, and not at school any more. By home situation we mean the people with whom the adolescent lives at home. The categories are: with both parents, with only one parent, with one parent and new partner of the parent, and other home situation. When adolescents are not living with both parents, we do not know why. Age varies from 12 to 17 years. Some cities asked not age but birth year.

With regard to methodological effects, we included a dummy variable informing us where and how the data had been collected. Cities that randomly sampled adolescents and collected the data using postal questionnaires are compared with cities that selected schools and collected the data in class. We also included a dummy variable to distinguish the influence of the number of items used to measure theft and vandalism. As shown in Table 1, some cities used more than one item to measure these delinquent acts.

### Analysis plan

In order to answer our research questions, we applied a multilevel design. In a multilevel design, units are nested within higher-level units – for this

<sup>4</sup> Composition might also play a role at the neighbourhood level. It may be that city differences in youth delinquency are the result of composition effects at the neighbourhood level, which means that cities with more high-crime neighbourhoods exhibit a higher level of youth delinquency. However, in this research we will focus only on individual composition effects.

<sup>5</sup> Surinamese and Antilleans are two separate ethnic groups with their own migration history in the Netherlands.

research individuals are nested within neighbourhoods, which are nested within cities. Usually individuals within the same higher-level unit resemble each other more than individuals from different higher-level units. Using multilevel analysis takes account of this clustering of similar individuals within the same units (Snijders and Bosker 1999). By performing multilevel analyses, we test whether differences in the extent of youth delinquency exist not only between individuals but also between neighbourhoods and cities. We test this by first estimating a model with differences only between individuals. Subsequently, a two-level model is estimated in which individual and neighbourhood differences in youth delinquency are present. If the analyses show a better fit for this model in comparison with the model in which only individuals differ, then there are also significant differences between neighbourhoods. The third step is to estimate a three-level model in which differences are allowed between individuals, neighbourhoods and cities, that is, a three-level random intercept model. Again, a significantly improved fit of this model would indicate variance at all three levels. Subsequently, when significant variance at the distinguished levels is shown, we continue by controlling for composition effects to check whether differences between neighbourhoods and between cities are the result of differences in population composition. As the final step, we insert methodological characteristics to examine whether city differences can be explained by differences in data collection. Because of the highly skewed distribution of the delinquency measure, we have used the square root of the raw delinquency measure as the dependent variable in these analyses.

## Results

Table 3 gives the results of the deviance tests for fitting the different models. These results show that extending the single-level null model with variance at neighbourhood level leads to a significant decrease in the likelihood statistic. Extending the model further, with variance at the city level, leads to a further significant decrease in the likelihood ratio statistic. These deviance values are both highly significant, indicating that there are significant differences between neighbourhoods and between cities concerning youth delinquency. Extending the three-level model with individual characteristics to control for composition effects improves the model. The deviance statistic decreases by 2210.9, which is highly significant with 18 degrees of freedom. In our final model we include two methodological characteristics, which improves the goodness of fit only slightly, and this increase is not significant ( $p=.083$ ) (see Table 3).

To estimate the amount of variance at different levels, the degree to which adolescents in the same neighbourhoods and/or the same cities

resemble each other, compared with adolescents in different neighbourhoods and/or cities, is illustrated by the intra-class correlation, which is the between-neighbourhood and the between-city variance expressed as the proportion of the total variance (Goldstein 1995).<sup>6</sup> The second column of Table 4 shows the variance at each distinguished level. Most of the variance in youth delinquency is at the individual level, that is, 0.329, which is 95.1 percent of the total variance. Of the remaining 4.9 percent of the variance, most can be attributed to the city level (0.016, which is 4.6 percent of the total variance). The variance at neighbourhood level is only 0.001, which is 0.3 percent of the total variance. Importantly, these results thus suggest that the city level is a more important social context than the neighbourhood for the explanation of youth delinquency. The improvement in the goodness of fit of the two-level random intercept model in Table 3, where variance in youth delinquency is allowed only between neighbourhoods and between individuals, has to be attributed to ignoring variance at the city level. In other words, from Table 3 it would appear that neighbourhoods differ in the extent of youth delinquency, but actually most of these differences are captured by differences between cities. Ignoring the city level can thus distort the real picture.

However, as we have suggested in previous sections, differences between cities and between neighbourhoods can be the result of differences in composition. Therefore, we expanded the random intercept model, that

**Table 3** Deviance tests of different (multilevel) models

<i>Model</i>	<i>-2*log likelihood</i>	$\Delta$ -2*log likelihood	<i>Degrees of freedom</i>	<i>P-value</i>
<i>Single-level mode</i>				
0 Single-level null model	30688.5	-	-	-
<i>Two-level model</i>				
1 Two-level random intercept model	29758.2	930.3	1	0.000
<i>Three-level model</i>				
3 Three-level random intercept model	29485.2	273.0	1	0.000
4 + individual characteristics	27274.3	2210.9	18	0.000
5 + methodological characteristics	27269.4	4.9	2	0.083

<sup>6</sup> For this three-level model, the intra-city correlation is the variance at city level as a proportion of the total variance:  $\rho = \sigma^2_{\text{city}} / (\sigma^2_{\text{city}} + \sigma^2_{\text{neighbourhood}} + \sigma^2_{\text{individual}})$ . The intra-neighbourhood correlation is the variance at neighbourhood level as a proportion of the total variance:  $\rho = \sigma^2_{\text{neighbourhood}} / (\sigma^2_{\text{city}} + \sigma^2_{\text{neighbourhood}} + \sigma^2_{\text{individual}})$ .



is, the null model in Table 4, with some individual characteristics to control for these possible composition effects. The results of the analysis of this expanded model are in the third column of Table 4. From Table 3 we know that expanding the three-level random intercept model with individual characteristics significantly increases the goodness of fit of the model. In Table 4 we see that model 1, that is, the random intercept model with individual characteristics, only moderately changes the variance components at the different levels. The city-level variance and the individual-level variance decrease slightly with the insertion of individual characteristics. The city-level variance decreases from 0.016 to 0.015 and the variance at the individual level decreases from 0.329 to 0.313. The neighbourhood-level variance, however, remains the same in this model. Hence, taking composition effects into account explains city differences in youth delinquency to some extent, but not neighbourhood differences.

The results of model 1 are largely in line with previous findings (see Table 4). In comparison with youngsters following higher secondary education, adolescents at lower secondary school and at other types of educational institution and those no longer at school, are shown to commit more delinquent acts. With regard to the home situation, it appears advantageous to reside with both parents. Adolescents living with only one parent, with one parent and the new partner of the parent, or in a different home situation engage in more delinquent behaviour. As expected, boys commit more delinquent acts than girls, and older adolescents are more delinquent than younger ones. However, with regard to ethnicity, unexpected findings appear. From previous findings, we expected that adolescents with a non-Dutch background would exhibit a higher level of youth delinquency than Dutch-born adolescents. Our findings suggest, however, that only adolescents with a mixed background (i.e. one Dutch parent and one non-Dutch parent) show more delinquent behaviour than Dutch adolescents. Adolescents with a Moroccan background and adolescents in the category 'other groups' engage in fewer delinquent acts than Dutch youngsters. This finding seems rather surprising, especially for Moroccan youth. Recent research using official police statistics in the Netherlands showed that youth from a Moroccan background were more likely to be recorded as a crime suspect than were Dutch adolescents, even after controlling for relevant background characteristics such as age, gender and school dropout (Blom et al. 2005). One explanation for the difference between self-report measures of youth delinquency and official police statistics for youth with a Moroccan background might be that Moroccan adolescents are more reluctant than Dutch youth to admit delinquent activities (Junger 1989; Junger and Haen Marshall 1997). However, this means that we have to be careful with statements about different ethnic groups.

**Table 4** Different multilevel models

	<i>Model 0: Three-level random intercept model</i>	<i>Model 1: Model 0 + individual charac- teristics (level 1)</i>	<i>Model 2: Model 1 + methodological characteristics (level3)</i>
Intercept	<b>0.280(0.039)</b>	<b>0.266(0.040)</b>	<b>0.212(0.077)</b>
<i>Individual characteristics (composition effects)</i>			
<i>Ethnicity (ref. Dutch)</i>			
Surinamese/Antillean		0.022 (0.020)	0.022 (0.020)
Turkish		-0.013 (0.020)	-0.013 (0.020)
Moroccan		<b>-0.104 (0.021)</b>	<b>-0.104 (0.021)</b>
Mixed		<b>0.076 (0.016)</b>	<b>0.076 (0.016)</b>
Other groups		<b>-0.054 (0.017)</b>	<b>-0.054 (0.017)</b>
<i>Education (ref. higher secondary)</i>			
Primary		-0.039 (0.034)	-0.037 (0.034)
Lower secondary		<b>0.080 (0.010)</b>	<b>0.080 (0.010)</b>
Other		<b>0.091 (0.022)</b>	<b>0.090 (0.022)</b>
Not at school		<b>0.140 (0.051)</b>	<b>0.142 (0.051)</b>
<i>Home situation (ref. Both parents)</i>			
One parent		<b>0.110 (0.013)</b>	<b>0.110 (0.013)</b>
One parent + new partner		<b>0.126 (0.020)</b>	<b>0.126 (0.020)</b>
Other home situation		<b>0.133 (0.031)</b>	<b>0.133 (0.031)</b>
Female		<b>-0.216 (0.009)</b>	<b>-0.216 (0.009)</b>
<i>Age (ref. Age 12)</i>			
Age 13		0.018 (0.018)	0.017 (0.018)
Age 14		<b>0.049 (0.017)</b>	<b>0.048 (0.017)</b>
Age 15		<b>0.090 (0.017)</b>	<b>0.089 (0.017)</b>
Age 16		<b>0.102 (0.020)</b>	<b>0.101 (0.020)</b>
Age 17		<b>0.117 (0.024)</b>	<b>0.117 (0.024)</b>
<i>City characteristics (methodological effects)</i>			
Data collected (1: in class at school)			0.127 (0.077)
More than 1 item for theft and vandalism			-0.032 (0.077)
Variance at city level	0.016 (0.007)	0.015 (0.006)	0.009 (0.004)
Variance at neighbourhood level	0.001 (0.001)	0.001 (0.000)	0.001 (0.000)
Variance at individual level	0.329 (0.004)	0.313 (0.003)	0.313 (0.003)

*Notes:* The dependent, variable, youth delinquency is represented by the square root of the number of committed delinquent acts ( $N_{\text{city}}=11$ ;  $N_{\text{neighbourhood}}=185$ ;  $N_{\text{individual}}=17,018$ ). Parameter estimates in bold are significant at the 1% level ( $p < 0.01$ ). Standard errors are in parenthesis.

In our final model, we introduced survey characteristics into the analysis. This expansion of the model did not provide a significant improvement in the goodness of fit (see Table 3). Both measures appeared to be non-significant. Hence the level of youth delinquency of an individual is not affected by survey characteristics, which do, however, explain some of the variance at the city level.

## Conclusion and discussion

The purpose of this paper was to examine whether the city level may contribute to the explanation of youth delinquency, alongside the influence of the neighbourhood and individual levels. Previous research on city differences in crime rates neglected the influence of individual and neighbourhood determinants (Blau and Blau 1982; Miethe et al. 1991; Shihadeh and Steffensmeier 1994; Shihadeh and Flynn 1996; Krivo and Peterson 2000; Parker 2001; Velez et al. 2003), whereas studies focusing on the neighbourhood and individual levels neglected higher-level explanations, such as city explanations, of youth delinquency (Sampson and Groves 1989; Peeples and Loeber 1994; Sampson et al. 1997; Wittebrood 2000; Beyers et al. 2001). Our description of previous research on city differences in crime rates showed that there are ample (theoretical) reasons to consider the city as an influential context of individual-level youth delinquency. We performed multilevel analyses in order to test whether variance in youth delinquency exists at city level, above and beyond variance at neighbourhood and individual levels. The results showed considerable variance at the city level, along with variance at neighbourhood and individual levels. Controlling for composition effects did not change the observed variance at the city level. Interestingly, our results suggest that the city is a more important context for the explanation of youth delinquency than the neighbourhood level, at least in the Netherlands. We found that neighbourhoods differ only marginally in the extent of youth delinquency. For the Dutch situation this is not so surprising considering the research of Rovers (1997) and of Schneiders et al. (2003), who also found only small differences between neighbourhoods. In Germany, Oberwittler (2004) too found only small differences between neighbourhoods. However, in comparison with American research, our results are more surprising, because neighbourhoods seem to differ more in the USA. It might be the case that in the Netherlands, and maybe also in other European countries, contrasts between neighbourhoods are less striking than in the USA with respect to youth delinquency, as also in other respects. Another explanation relates to our measure of youth delinquency. Owing to the use of secondary data, we

have information on only six delinquent acts. Of these acts, we know only whether adolescents committed these acts in the previous 12 months. Maybe neighbourhoods in our research will differ more when delinquency is measured more extensively.

Our findings showed further that differences in youth delinquency between cities cannot be explained by different modes of data collection, because the effect of this variable was not significant. Based upon previous research (Naplava and Oberwittler 2002), it was expected that home questionnaires would lead to an underrepresentation of delinquent behaviour. A possible reason why our results do not support this expectation is that, in Naplava and Oberwittler's study, face-to-face interviews were conducted at home and written questionnaires in class. This might indicate that it is not the place where the data are collected that matters, but the way in which the data are collected. It would appear that written questionnaires increase the feeling of anonymity among respondents. More research is needed to further disentangle the relationship between the place of data collection and under- (or over-) representation of sensitive behaviour, such as delinquency.

Additionally, our results indicate that, by ignoring the city level, variance at neighbourhood level is overestimated. This might also account for research using data from different neighbourhoods across different municipalities, focusing on the effect of neighbourhood characteristics and neglecting higher-level determinants, such as the studies of Sampson and Groves (1989) and Wittebrood (2000). Sampson and Groves found that, the more ethnically heterogeneous neighbourhoods are, the higher the extent of violent offending. Wittebrood found that structural neighbourhood characteristics, – low economic status, high ethnic heterogeneity, high residential mobility – affect violent victimization. In research studying city differences in crime rates, the same measures are used but then measured at the city level to explain city differences in crime rates. There is evidence that these characteristics explain city differences in crime rates (Blau and Blau 1982; Logan and Messner 1987; Land et al. 1990; Miethe et al. 1991). This raises the question of whether the results of Sampson and Groves and of Wittebrood on the explanatory power of neighbourhood characteristics would still hold when the city or the municipality level is included as a unit of analysis. Including this higher level makes it possible simultaneously to test the influence of different determinants derived from social disorganization or social stratification theory, located at the city level as well as at the neighbourhood level, to disentangle respectively whether these determinants at city level and at neighbourhood level have separate effects on crime, over and above individual-level effects.

Moreover, we propose to link these different levels of analysis both theoretically and empirically. Strategies and procedures included in multilevel analyses provide the tools to disentangle these effects at different levels. For example, from social stratification theory the hypothesis can be derived that, the higher the level of absolute and/or relative deprivation in a city, the greater the extent of delinquency. The same hypothesis can be related to the neighbourhood level. In a similar vein, it is argued that, at the individual level, poverty is related to delinquency: the lower one's income, the more delinquent behaviour one shows (e.g. Farrington 1995). To disentangle the effect of poverty on youth delinquency at the different levels, contextual and individual measures of poverty at city, neighbourhood and individual levels should be simultaneously examined in a multilevel design. In this way, it can be determined to what extent characteristics at the different levels have separate and independent effects on youth delinquency.

To conclude, we believe that our results illustrate that the city can play an important role in the explanation of crime and delinquency. How strong this role is above and beyond the influence of the neighbourhood and individual characteristics should be tested in future research, especially because in the Netherlands the neighbourhood is an important context for the development of policies to reduce crime levels. If our results are replicated in future investigations that focus on a broader age group and study not only self-reported delinquent behaviour, then it might be useful for policy makers to take into account the city level as well as the neighbourhood level. Furthermore, the conclusions in this paper form a worthwhile first step towards an integration of different contextual levels for the explanation of individual levels of youth delinquency. Future research must document in more detail the relative importance of city-, neighbourhood- and individual-level explanations of youth delinquency.

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