Perceived safety in socially vulnerable neighbourhoods: A combined multilevel and latent class analysis of factors influencing perceived safety

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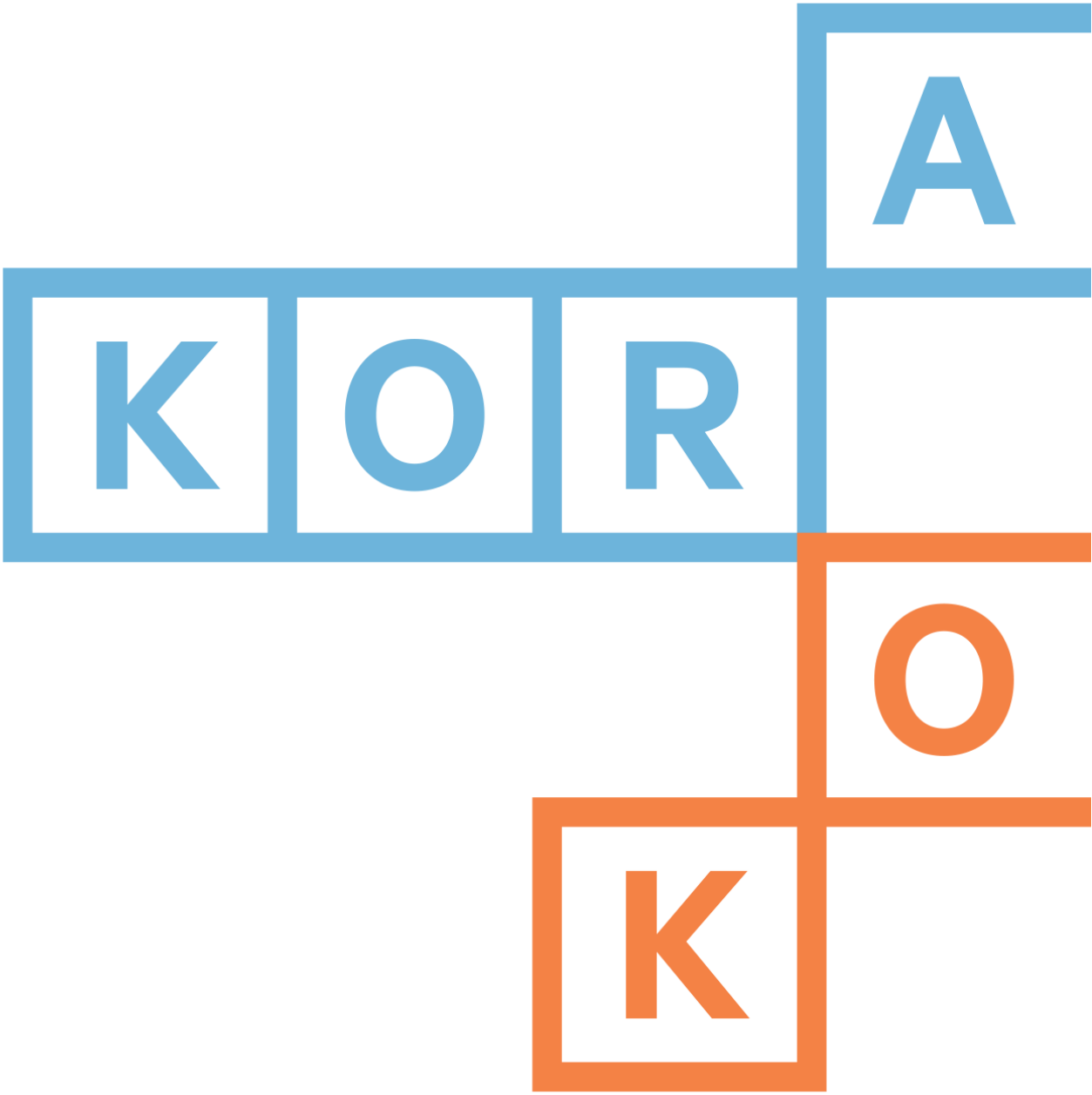

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Introduction

In Denmark, socially vulnerable areas have lower education rates (Larsen et al., 2015), higher unemployment rates (Sigurd et al., 2011) and higher crime rates (Christensen et al., 2010; Sigurd and Madsen, 2011) compared to other areas in Denmark. Moreover, in these areas there is a greater likelihood of mothers not living with their family, having been convicted of crime, receiving unemployment benefit, having no education and having poor living conditions (Frederiksen et al., 2015). In addition to this, fear of crime is markedly higher in socially vulnerable areas (Kjeldsen and Avlund, 2016). The reasons for taking fear of crime seriously are clear. Dolan and Peasgood (2007), Moore and Shepherd (2006) and Pope (2008) find significant economic and social costs related to fear of crime. Furthermore, studies find significant negative relationships between fear of crime and physical and mental health (Jackson and Stafford, 2009; Pearson and Breetzke, 2014; Stafford et al., 2007). As a natural consequence, fear of crime/perceived safety has also received considerable attention in criminology literature for several decades, see, for instance, Hale (1996) for a review of the yearly studies, or the many studies in the British Journal of Criminology, Crime & Delinquency and Criminology.

The *perception of (un)safety* may be closely related to *fear of crime*, and the two terms are often, as in this study, used interchangeably. Fear of crime is a complex social phenomenon, which may have implications at both the personal and the societal level. However, at the conceptual level *fear of crime* has various definitions. According to one definition, *fear of crime* is "a rational or irrational state of alarm or anxiety engendered by the belief that one is in danger of criminal victimization" (McLaughlin and Muncie, 2006). This study relies on an understanding of fear of crime that links the fear specifically to a person's own neighbourhood.

A widespread assumption in literature is that fear of crime is directly related to actual crime levels and the objective and calculated risk of victimization. According to this assumption, a decrease in crime rates should cause levels of fear of crime to decease correspondingly. Therefore, effectively combatting crime would cause the level of fear to decrease. However, fear of crime does not refer to the actual likelihood of crimes being committed, but to the fear of becoming a victim of crime. Research seems to have demonstrated that the risk of victimization is not to be confused with the risk of crime and that victimization is only weakly related to fear (Hale, 1996; Vanderveen, 2006). Whilst higher crime rates in one neighborhood in some cases may correlate with levels of fear, this is not true for all groups and places. For instance, women and older people experience higher levels of crime than others when income, education and individual characteristics are taken into consideration (Ferraro, 1995; Garofalo and Laub, 1978).

Other factors may therefore be related to fear of crime/perceived safety, for instance perceptions of the local social and physical environment, and the general sense of vulnerability. For instance, even if a crime level is low, levels of fear/perceived safety may be high due to, for instance, weak social networks, lack of community cohesion or a generally low level of social capital – meaning that social participation and generalized trust in other people may be low – or the presence of inter-group conflicts. Social capital and generalized trust are related to, but conceptually and empirically very different from, fear of

crime/perceived safety. However, there are quite strong arguments for these being causally linked (Lindström et al., 2003).

Coming closer to understanding the mechanisms underlying the causes of fear of crime is essential for reducing fear of crime – particularly in socially vulnerable areas, which often have higher crime-related activities. Kjeldsen and Avlund (2016) present a brief overview of the potential determinants and explain variation in fear of crime in socially vulnerable areas in Denmark. In the present paper, we elaborate on their findings and the report by Avlund (2012) and carry out more systematic regression analyses, in order to determine the magnitude of the potential relationships between the included variables and people's general fear of crime/perception of safety in their neighbourhood.

In this paper, and this is also our main contribution to the literature, we estimate fear of crime/perceived safety relationships in 31 socially vulnerable neighbourhoods using a unique nation-wide dataset with answers from nearly 6,000 respondents, which is linked up with administrative registry data covering all 82,000 persons living in those 31 neighbourhoods. To the authors' knowledge, this is the first study of its kind in Denmark[1]. Internationally, apart from a few studies (Franzini et al., 2005; Kling et al., 2005; Pantazis, 2000), we have not been able to find studies that specifically address fear of crime in vulnerable/poor neighbourhoods on a national level.

More specifically, we estimate the relationships between the sociodemographic characteristics of the respondents and their perceived level of fear of crime (Chadee and Ditton, 2003; Cops and Pleysier, 2011; Wyant, 2008). We also include variables on the ethnicity of the respondents of both first *and* second-generation immigrants (Hinkle, 2015). Furthermore, we include variables related to social trust (Brunton-Smith et al., 2014; Swatt et al., 2013), information on direct personal offences (Jackson and Gray, 2009; Mcgarrell et al., 1997) and information on *voter turnout* (Coleman, 2002) as proxies for efficacy. We include a range of neighbourhood variables that capture the relationships between neighbourhood characteristics and fear of crime/perceived safety, such as income equality (Rueda and Stegmueller, 2016), level of unemployment (Franklin et al., 2008) and ethnic composition (Wyant, 2008), including the proportion of *second-generation* immigrants. Furthermore, we include information about age structure. Finally, we also include variables controlling for perceived neighbourhood disorder using a latent class approach (Brunton-Smith et al., 2014).

[1] In Denmark, fear of crime has received a great deal of attention and has been analysed continuously over the past 16 years (Andersen et al., 2013; Hede et al., 2009; Hede and Andersen, 2007; Hede et al., 2011; Huset Mandag Morgen and TrygFonden, 2004; Huset Mandag Morgen and TrygFonden, 2005). In addition to these studies, studies have been carried out focusing specifically on fear of crime among young people (Balvig and Holmberg, 2005; Larsen et al., 2013; Rådgivende Sociologer, 2008) and immigrants (Shakoor and Wellendorf, 2006). The Danish police has also carried out two surveys, in 2013 and 2015 (Rigspolitiet, 2013; Rigspolitiet, 2015). Finally, even municipalities have carried out fear of crime surveys. For instance, the municipalities of Copenhagen and Odense (the third largest city in Denmark) have carried out fear of crime surveys aimed specifically at their own residents (Municipality of Copenhagen, 2014; Municipality of Odense, 2013).

Data

The analysis of fear of crime/perceived safety in socially vulnerable neighbourhoods is based on a dataset combining data from a survey carried out by the Danish police in 2012-2013 on perceived safety (Rigspolitiet, 2013) and population-based administrative registries supplied by Statistics Denmark from 2012-2013. The administrative registry data provides detailed information on the background of individuals who were invited to participate in the survey, and also the entire population in the vulnerable areas. The data include information on age, gender, income, level of education, country of origin, home address, crime etc. The survey was carried out partly as a telephone survey and partly as a web survey in the period November 2012 to February 2013. When necessary, an interpreter was used or the questions were translated. A stratified random sample was used to ensure representability of the population in Denmark aged 15 or older. In total, 12,238 respondents were interviewed. Among the 12,238 respondents, 5,958 lived in social housing residences in 31 out of 34 socially vulnerable neighbourhoods. The socially vulnerable neighbourhoods are defined by the Danish police based on a professional judgement of the crime level and are areas that need additional efforts/resources. The response rate in the socially vulnerable neighbourhoods was 51.7%, compared to the overall response rate for the survey of 58.5%. Though the response rate is relatively high, some skewness in the effective sample relative to the original sample are present. A analysis indicates that the people participating in the survey are generally better educated, have a higher income, Is Danish by country of origin and less socially vulnerable than the people who were invited but did not complete the survey (see Appendix A). There is no straightforward way to handle this issue. One could choose to use weighting adjustment to render the sample more representative of the population in the vulnerable neighbourhoods. However, using weighted data is not unproblematic (Solon et al., 2015). Solon et al. recommend using weights when conducting descriptive analyses and exercising caution when analysing causal effects. No matter what, when weighting data you implicit assume that the underrepresented subsample who answered the survey (in this case the socially vulnerable) is representative of those who did not answer the survey. This assumption is by no means a matter of course. However, we choose to use weighted data to take into account the fact that the data were collected using a stratified sampling approach, where some vulnerable areas are oversampled and others are under sampled. The survey respondents' share of the population in the neighbourhoods from which they were sampled are as a high as 23.1% and as lows as 1.6%, see Table 1. As a test of robustness, we conduct the analysis without applying any weights. A descriptive analysis of the unweighted and weighted data can be seen in Table 3.

Table 1: Number of respondents by socially vulnerable neighbourhood

Neighbourhood	n	N	Share (n/N)	Neighbourhood	n	N	Share (n/N)
Alias Vapnagård, Nøjsomhed	187	5,577	3.4%	Kongens Vænge - Østervang	214	1,619	13.2%
Askerød	172	1,423	12.1%	Korskærparken	230	1,815	12.7%
Avedøre Stationsby	227	5,280	4.3%	Løget By	212	1,646	12.9%
Bispehaven	188	2,256	8.3%	Løvvangen	100	1,630	6.1%
Egedalsvænge	170	2,675	6.4%	Motalavej	182	1,578	11.5%
Ellemarken	223	2,039	10.9%	Nørager/Søstjernevej	231	1,256	18.4%
Finlandsparken	214	1,497	14.3%	Remisevænget	200	3,394	5.9%
Folehaven	186	1,883	9.9%	Ringparken, Slagelse	194	1,792	10.8%
Gadehavegård	158	1,980	8.0%	Sebbersundvej mv	195	1,101	17.7%
Gellerupparken/Toveshøj	167	6,699	2.5%	Skovvejen/Skovparken	178	2,275	7.8%
Gullestrup	161	843	19.1%	Stengårdsvej-kvarteret	190	1,783	10.7%
Havrevej	220	1,096	20.1%	Sundparken	189	1,456	13.0%
Hjortegården	224	4,435	5.1%	Tingbjerg/Utterslevhuse and Gadelandet	108	6,956	1.6%
Houlkærvænget	211	912	23.1%	Vollsmose	174	8,606	2.0%
Karlemoseparken	237	1,477	16.0%	Værebroparken	202	2,741	7.4%
Kildeparken	214	2,349	9.1%				

Note: In total, 5,958 respondents are included in the analysis. n = number of survey responses. N= population in neighbourhoods aged 15+.

Conceptualisation of neighbourhoods in the analysis

In the present paper, neighbourhoods variables in the analyses are defined by geographical boundaries of the socially vulnerable areas and *not* how people perceive the boundaries of their own neighbourhoods and the sense of belong to an area/local community. In light of the research in the area (Jørgensen, 2010; Jørgensen et al., 2016), this is a limitation. Similarly, we do not explore the potential geographical subdivisions of each neighbourhood defined by green spaces, differences in physical structure or areas with higher crime levels, see Snedker (2015), for instance. Finally, the aim of the paper is to take advantage of the variation in the sociodemographic characteristics of the neighbourhoods, variation in the share of respondents who have been exposed to crime and their faith in the police. We do this by including this information at the neighbourhood level. Therefore, we do not focus on the potential differences in the fear of crime/perceived safety function among neighbourhoods, nor do we directly compare the level of fear of crime/perceived safety among neighbourhoods. Though this would clearly be worth investigating in future work, it is not done in the present paper.

Dependent variable: Perceived safety

The concept of safety/fear of crime is a point of contention in the criminological literature (Hinkle, 2015). For instance, Farrall and Gadd argue that one should measure the concept of safety/fear of crime by asking directly about fear of becoming a victim of crime followed by questions regarding the frequency and magnitude of the fear (Farrall and Gadd, 2004). Likewise, measuring perceived safety using questions such

as “How safe do you feel or would you feel being out alone in your neighbourhood at night?” is criticised for overstating the fear of crime because of the leak of asking directly about fear of crime (Hinkle, 2015; Jackson, 2004).

Nonetheless, we choose to use the fear of crime concept of perceived safety rather than fear of crime itself. The choice of outcome measure is based on the following considerations: First of all, we wish to capture the general perception of safety among residents in vulnerable neighbourhoods. Our aim is to use a concept that not only captures the degree of safety related to crime, but also aspects of the concept that are related to non-specific threats in the neighbourhood. The reason is that we want to investigate which factors affect the general perception of safety in a neighbourhood, because these factors may be important when endeavouring to make vulnerable neighbourhoods more attractive for newcomers.
One could argue that other measures, such as experienced offenses in the neighbourhood, are a more objectively given measure for safety. However, it is not clear whether experienced offenses necessarily lead to lower feelings of safety among the respondents. Take for instance areas with a high number of offenses. Persons living in these areas may perceive offenses as a normality or may adjust their behaviour to avoid becoming crime victims.

Though we in the data have information related to perceived safety in the traditional manner: “How safe or unsafe do you feel about being in your neighbourhood at night?”, we have chosen to use a question measuring the perception of safety in the neighbourhood generally. The reason for this is that the “Safe at night” question is criticised for discriminating people who are not in the neighbourhood at night (Garofalo, 1979). The perceived safety is measured by a question asking the respondents to rate how safe they feel in their neighbourhood. The advantage of this choice is that we get an overall picture of the level of perceived safety and not merely a picture of perceived safety risks associated with night time events. On the other hand, by doing this we also run the risk that some people might only focus on night time events while others will not, a problem for which we are unable control. The exact wording of the question can be seen in Table 2.

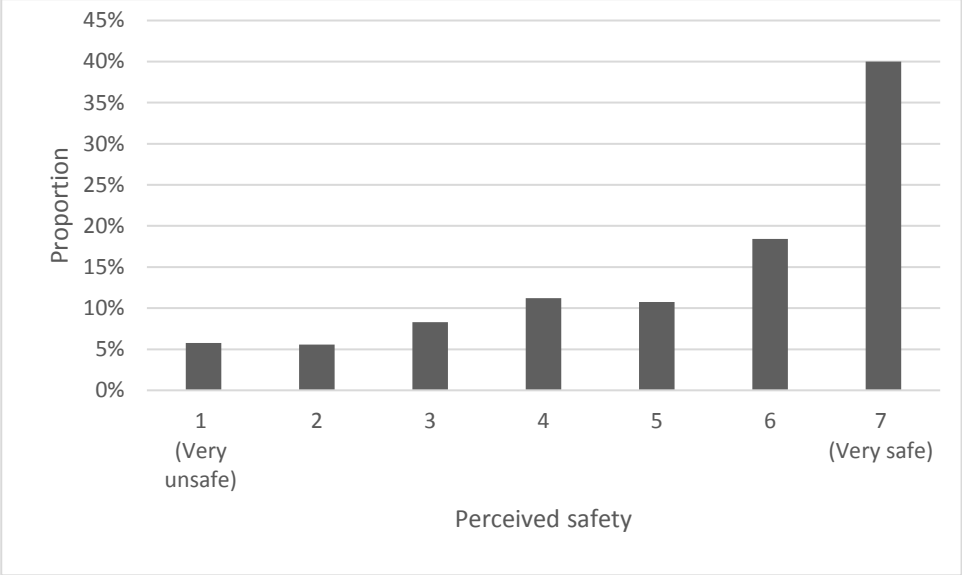
Table 2: Conceptualisation of perceived safety

Variable	**Survey question**
Perceived safety	On a 7-point scale, where 1 is ”Basically I feel safe in my neighbourhood" and 7 is ”Basically I feel unsafe in my neighbourhood," how safe or unsafe do you feel? (Your neighbourhood means the area immediately surrounding your residence.)

Note: The variable is coded using at survey question from The Danish National Police.

In the analysis, the variable is recoded so that higher values indicate a higher degree of safety and lower values indicate a lower degree of safety. 24 respondents answered "do not know" or refused to answer. These respondents were not included in the analysis. The distribution of the perceived safety is presented in Figure 1 below.

Figure 1: Distribution of perceived safety



Method

The Statistical model

Our analysis of perceived safety includes variables at both the individual level and the neighbourhood level. It is reasonable to believe that the answers from the respondents are nested within the neighbourhoods, i.e. that characteristics of a neighbourhoods influence the behaviour and opinions of the respondents in that neighbourhood. Therefore, it is useful to use a multilevel model that is explicitly designed to handle data organised at different levels of analysis (Johnson, 2010). This type of statistical model will handle the problem of ecological fallacy, as well as correcting the standard errors, by correcting for correlations between observations within each area. However, a formal test exists that calculates the interclass correlation coefficient, which represents the proportion of the total variance that is attributable to between-group difference:

$$\rho = \frac{\psi}{\psi+\theta} \qquad (1)$$

If the between-cluster variance "ψ" (the variance between the neighbourhoods) is not zero, the existence of a multilevel problem is indicated. A formal likelihood-ratio test of the unconditional model (the empty

model) shows that our data are indeed of a hierarchical nature[2]. To overcome this problem, we use a multilevel model.

We are interested in explaining neighbourhood-level mean differences in perceived safety (not differences in coefficients). Therefore, we employ random intercept models, in which the slopes (coefficients) remain fixed. The random intercept model can be described as follows (Johnson, 2010):

$$\text{Level 1:} \qquad Y_{ij} = \beta_{0j} + \beta_{1j}X_{ij} + \varepsilon_{ij} \qquad (2)$$

$$\text{Level 2:} \qquad \beta_{0j} = \gamma_{00} + \gamma_{01}W + \varepsilon_{0j} \qquad (3)$$

where level 1 intercept β_{0j} is modelled as an outcome in the level 2 portion of the model, (2) illustrates, that the intercept β_{0j} is in fact a product of the level 2 intercept γ_{00} and the error term of level 2, ε_{0j}, which accounts for group level dependence. X_{ij} and W_{0j} are level 1 and level 2 predictors, respectively. This means, that the intercept is allowed to vary randomly across level 2 units (neighbourhoods). Level 1 and 2 can be combined as follows[3]:

$$Y_{ij} = \gamma_{00} + \beta_{1j}X_{ij} + \gamma_{01}W + \varepsilon_{ij} + \varepsilon_{0j} \qquad (4)$$

We are treating our response variable – perceived safety – as a metric variable. In other words, we are modelling the relationship between the independent variables and the dependent variables using a multilevel linear model. However, the dependent variable is measured on a 7-point scale, indicating that the variable is not truly metric. Therefore, we conduct a robustness test using an ordered logistic model.

Data weights and scaling in multilevel models

As mentioned earlier, one could argue that data weights should be applied in the analysis. However, applying weights in multilevel analysis can be problematic (Stata, 2016). First of all, it is necessary to include weight at both the individual level, w_{ij} (level 1 weights), and at the neighbourhood level, w_j (level 2 weights). Level 1 weights are available from the data. Level 2 weights are estimated using the formula presented by Harvey Goldstein (Goldstein, 1999):

$$w'_j = \frac{W_j * \mathrm{J}}{\sum_j W_j}, \qquad where: \qquad W_j = \frac{(\sum_j w_{ij})}{n_j} \quad and \quad \mathrm{J} = \text{total number of level 2 units} \qquad (5)$$

Furthermore, it is necessary to scale the weights, since failing to do so would cause regression coefficients to be biased and variance component estimates to be inaccurate (Rabe-Hesketh and Anders, 2006). There a

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2 Rho-hat is rather small (0,046, ψ =0.16 and θ =3.26), however the likelihood-ratio test is highly significant (p<0,001) indicating a significant amount of variance at our level two in our model (the neighbourhood level).

3 We have tested whether the random intercept model is consistent, i.e. whether there is indication of omitted variable bias. Normally one would use a Hausman test to test whether the coefficients in the random intercept model differ significantly from those in the fixed-effect model (which is always consistent). However, because of violation of the assumptions underlying the Hausman test, we have conducted a manual inspection of the parameter estimates in the random intercept model and the fixed-effect model. There are no differences in the parameter estimates across the two models. This indicates that the random intercept model is consistent.

several ways to do this (Rabe-Hesketh and Anders, 2006; Stata, 2016). However, no consensus exists with regard to which scaling method is the best to use. Therefore, it is recommended to try out all scaling methods and to make sure the results achieved are relatively robust. We apply effective scaling, which specifies that first-level weights are scaled so that they sum to the effective sample size of their corresponding second-level cluster (Stata, 2016). Other types of scaling (sizes) yield almost the same results.

Linear latent class model (Finite mixture model, FMM)

The multilevel model is used to estimate the relationships between perceived safety and a range of independent variables covering socio-demographics, social trust, human capital and reported exposure to crime (see more on this below). However, it is also an aim to estimate the potential relationship between perceived neighbourhood disorder and perceived safety. Perception of neighbourhood disorder or incivility has been analysed directly as an independent variable (Robinson et al., 2003; Wyant, 2008). However, we have chosen to model the relationships between perception of neighbourhood disorders and perceived safety using a latent class strategy (Brunton-Smith, 2011; Brunton-Smith et al., 2014; Gray et al., 2011; Hinkle and Weisburd, 2008; Jackson and Gray, 2009) i.e. finite mixture model.

The latent model specifies that the density of the dependent variable, perceived safety, is a linear combination of *k* different densities (*k* - classes), where j^{th} density is $f_j\left(y\middle|\beta_j\right), j = 1,2, \dots, k$. So, a *k* latent model is defined by:

$$f(y|\beta,\pi) = \sum_{j=1}^{k} \pi_j f_j\left(y\middle|\beta_j\right),\ 0 \le \pi_j \le 1,\ \ \sum_{j=1}^{k} \pi_j = 1 \qquad (6)$$

where π_j is the probability of the j^{th} class membership, also referred to as the mixing fraction. The π_j is typically unknown and is estimated in the model as a function of observables of the individual, in our case the perceived level of neighbourhood disorder. This is done using a logit model estimating the probability of belonging in class *j*, relative to the other classes. The latent class model is used, as it can be difficult to determine whether a high level of perceived neighbourhood disorder makes people feel less safe or whether it is a low level of perceived safety that makes people more sensitive towards neighbourhood disorder and thus report a higher level of disorders. Using perceived neighbourhood disorder as an independent variable to explain perceived safety might thus introduce endogeneity bias into the model. Inspired by other studies using the latent class model to estimate relationships between potential endogenous variables, such as geographical sorting and attitudes in the class membership function (Boxall and Adamowicz, 2002; Strazzera et al., 2012), we therefore apply a latent class linear regression model (Cameron and Trivedi, 2009; Eckardt et al., 2016; Jackson and Kuha, 2014). More specifically, we estimated the model with the FMM code in STATA (Deb, 2007)[4]. In the model, the independent variable is estimated

[4] A latent class multilevel model is estimated in Franzini et al. (2005) using the statistical software MPLUS (Muthén and Muthén, 2007). However, we do not have access to MPLUS.

as having a log-normal distribution, which is equivalent to taking the log of the perceived safety variable. Though estimated with different models setups, the finite mixture model could not converge with a normal distribution assumption. For the purpose of the analysis, namely modelling the class membership function into the latent classes, this is not a problem, however. The model contains two classes. Models with a higher number of classes did not converge.

Independent variables in the models

The independent variables are classified in three dimensions. The first classification, into level 1 or level 2, relates to the level to which they are included in the multilevel regression model. The second classification relates to the origin of the data, i.e. whether they are survey or administrative data. The third dimension relates to the type of variable included: socio-demographics, characteristics of the respondent, perception of social trust, human capital, personally experienced neighbourhood disorder and experienced level of crime. In the following, the variables are described and put into the context of the literature. For an overview of the descriptive statistics, see Table 3 and for a conceptualisation of the variable see Appendix B.

Individual Variables

Sociodemographic variables

Age and gender are among the strongest predictors of fear of crime in the literature. Females generally have a higher fear of crime (Cops and Pleysier, 2011; Gilchrist et al., 1998; Smith et al., 2001). In relation to this, Lagrange and Ferraro (1989) find that females have higher fear levels for a wide range of fear items. Interestingly, Schafer et al. (2006) find that gender differences are moderated by demographics at the individual level, though the gender difference may be questionable, see for example Sutton and Farrall (2005). The age-fear of crime relationship is less clear, and the literature has debated whether older people have a higher fear of crime or not, see Chadee and Ditton (2003) for a review. Both gender and age variables are included in the analysis.

We also include education level, occupational status and income level in the analysis. Higher income or better financial status are generally found to be correlated to lower fear of crime (Elo et al., 2009; Mcgarrell et al., 1997; Moore and Shepherd, 2006; Moore and Shepherd, 2007; Pantazis, 2000; Will and Mcgrath, 1995). Vancluysen et al. (2011) find that, generally, people who are better off financially have a lower fear of crime, though this is significant among a subgroup of respondents only. Pitner et al. (2012) find no significant relationships between income and fear of crime. The educational level is an expression of the respondent's level of human capital (Becker, 1964; Coleman, 1988; Schultz, 1961). The educational findings are somewhat mixed. Moore and Shepherd (2006; 2007) and Vancluysen et al. (2011) find that people with a higher level of education have a lower fear of crime, though Vancluysen et al. (2011) find significantly reduced fear among Flemish persons only and not among foreigners. Elo et al.(2009), Scarborough et al.

(2010), Swatt et al. (2013) and Wyant (2008) obtain insignificant results, whilst Rueda and Stegmueller (2016) find that more years of education are associated with higher levels of fear of crime. Along the same line of thought, we also include variables presenting different types of occupational status.

Ethnicity

In the fear of crime literature, it is common to control for the ethnicity among the respondents. For example, Vancluysen et al. (2011) find significant differences in fear of crime among Flemish, Turkish and Moroccan descendants. See also Elo et al. (2009) and Scarborough et al. (2010) for more studies with significant differences. Difference in fear of crime between ethnic groups are not found in all studies (Hinkle, 2015; Sampson et al., 1997; Wyant, 2008). We also include information about the ethnicity of the respondents. In addition, we test whether first and second-generation non-Western immigrants have different perceptions of perceived safety. The differentiation between first and second generation immigrants is motivated by the fact that crime rates for first and second generation immigrants differ in Denmark (Holmberg and Kyvsgaard, 2003). Interestingly Bersani (2014), find that the rate of crime among second generation immigrants "catches up" with that among children of native-born citizens, and the study by (Hällsten et al., 2013) finds few difference between children of native Swedes and children of immigrants. Accordingly, we could also expect the perceived safety levels for Danes and second-generation immigrants to be more in line. Furthermore, the share of second-generation immigrants from non-Western countries is increasing in Denmark, which makes it particularly interesting to analyse whether the rates differ.

Social trust

Social trust is closely related to the concept of collective efficacy, which previous studies have shown to have a significant effect on perceived safety/perceived crime (Brunton-Smith et al., 2014; Sampson et al., 1997). Unfortunately, the survey does not include questions that are traditionally used to capture social trust. Instead, a variable measuring the respondent's faith in authorities (the police) is used. Faith in or satisfaction with the police has been used in Scarborough et al. (2010) and Swatt et al. (2013), though Jackson and Bradford (2009), for instance, discuss the causal relationship between trust and fear of crime. Following Coleman (1988), Elo et al. (2009) and Swatt et al. (2013), the number of years the respondent has lived in the neighbourhood is also included in the analysis as a proxy for general social trust.

Direct personal offences

Relationships between fear and victimisation variables regarding offenses directed towards the respondents are included in the analyses. In addition to a single variable in (Abdullah et al., 2014; Gray et al., 2011; Hinkle, 2015; Jackson and Gray, 2009) capturing overall direct victimization we follow (Mcgarrell et al., 1997; Pitner et al., 2012; Yun et al., 2010) and make distinctions between the different types of offences. In total, we include four variables regarding the respondents' personal experience with offences.

Perception of neighbourhood disorder

Perception of neighbourhood disorder or incivility has been analysed in several studies (Gray et al., 2011; Hinkle and Weisburd, 2008; Jackson and Gray, 2009; Robinson et al., 2003; Wyant, 2008). In total, we include 16 variables controlling for the type of perceived neighbourhood disorder.

Besides the variables measuring faith in the police, personally experienced offenses and perceived neighbourhood disorder, all variables are coded using administrative data. The independent variables are presented in Table 3

Neighbourhood Variables

The inclusion of variables on the neighbourhood level is restricted by the fact that the data only covers 31 areas. Accordingly, in the analysis of variables explaining variation in perceived safety on the neighbourhood level a limited number of variables have been tested. It should be noted that we include variables from the survey. Accordingly, for those variables we do not have information from all persons living in the neighbourhoods, but for the respondents who participated in the survey only. This is naturally a limitation of the study.

Gender

As mentioned above, female respondents are generally found to be more fearful compared to male respondents (Cops and Pleysier, 2011; Smith et al., 2001). In relation to this, Lagrange and Ferraro (1989) find that females have higher fear levels for a wide range of fear items. Interestingly, Schafer et al. (2006) find that gender differences are moderated by demographics at the individual level. Though the aim of this paper is not to venture down the gender-fear-gap path, we have the opportunity to investigate whether perceived safety correlates with the gender distribution in the various neighbourhoods. It should be mentioned that we initially also included an interaction between the gender of the respondent and the share of males in the neighbourhood. The interaction was not significant and is therefore not included in the final model.

Age

Most fear of crime studies test relationships between age and fear of crime or interact age with the gender of the respondent. However, to our knowledge no studies have tested the relationship between the distributions of older vs. younger respondents in the neighbourhood. This is in spite of the fact that the literature finds significant relationships with the distribution of other socio-demographic variables, such as the reported income relationships and share of immigrants. We therefore include three age-relationships variables at the neighbourhood level in the analysis. We include a variable controlling for the average age in the neighbourhood, the standard deviation of the age in the neighbourhood and an interaction between the two variables.

Income inequality

Income inequality is found to correlate significantly with fear of crime significantly (Bratanova and Vauclair, 2016; Rueda and Stegmueller, 2016). We therefore also include information on the distribution of income. Several models were tested, and a model accounting for the share of low-income households provided the best fit.

Ethnicity

At the individual level, we test relationships between ethnic origin and the perceived safety. Following the literature finding significant relationships between racial heterogeneity and fear of crime (Eitle and Taylor, 2008; Vancluysen et al., 2011; Wyant, 2008), we include information on the distribution of non-Western immigrants and the descendants of non-Western immigrants. To our knowledge, the latter has not been tested in the literature before.

(Youth) unemployment rate

Franklin et al. (2008) test the ratio of unemployed persons at the city level to the fear of crime, but find no significant relationships. Inspired by their approach, we initially also included a variable controlling for the share of unemployed persons at the neighbourhood level but found no significant relationships. However, based on Lupton and Tulloch (1999), the potential unemployment relationships with fear of crime may be specifically related to youth unemployment. Young people without a job might hang around in the neighbourhood, thus generating a higher fear of crime. We therefore include information on the level of unemployment among young people (16-24 years) in the neighbourhoods.

Social trust

The level of social trust/efficacy is captured by the variable controlling for the share of people that have lived in the neighbourhood for five or more years, see Coleman (1988), Elo et al. (2009) and Swatt et al. (2013). In addition to this variable, we also include information on the voter turnout for the local elections in 2013. The inclusion of the voter turnout is inspired by the work of Coleman (2002), who used voter turnout to model conformity effects on crime rates. We have information on the voter turnout for the electoral ward for each neighbourhood. However, the electoral wards' boundaries go beyond the boundaries of the vulnerable neighbourhoods. Accordingly, the voter turnout also includes people living outside the vulnerable area. Clearly, the higher the share of people in the electoral ward who live outside socially vulnerable areas, the lower predictive power the voter turnout estimate has. We therefore also include a variable controlling for the share of people from the vulnerable neighbourhood in the electoral ward and an interaction between the voter turnout and the share of people from the vulnerable neighbourhood in each electoral ward. Finally, we include a variable controlling for the share of respondents who have faith in the police.

Crime level

Crime levels in the neighbourhoods can be measured in a number of ways. We are in possession of data on the actual number of offenses reported to the police, as well as information regarding the number of residents in each neighbourhood who have been charged with a criminal offense. In spite of this, we use information from the surveys questions related to experienced offences in respondents' neighbourhood. We chose not to use the actual number of offenses reported to the police, because these data are likely to be subject to significant underreporting. This problem has previously been analysed in (Balvig and Kyvsgaard, 2006; Pedersen et al., 2015). The level of underreporting of crime decreases with severity of the type of crime. Underreporting is as high as 90% for violence and 62% for petty theft (<500 DKK in value) and constitutes a problem for the validity of the use of data on offenses reported to the police[5]. Likewise, we do not use the detailed information regarding the share of residents in each neighbourhood who have been charged with an offense. We have conducted regression analyses including the share of residents charged with: sex offences, simple violence, grievous bodily harm (GBH), arson, vandalism, reckless driving, possession of drugs and violation of the firearms act. The results indicate that these variables are problematic. All variables but sex offences have a significant relationship with the perceived safety in the neighbourhood, though with varying directions. Simple violence, arson and vandalism thus seem to covariate positively with the perceived safety. As we have no real explanation for these results, we choose not to include the variables in the analysis. We therefore include variables controlling for the share of respondents who have been exposed to violence, burglary, vandalism or theft.

All variables but the share of residents with faith in the police and the share of residents exposed to crime have been coded using administrative data.

Table 3: Descriptive statistics of the dependent and the independent variables

	N	Mean	SD	Min	Max	Weight-ed mean
Individual level						
Perceived safety	5934	5.36	1.85	1	7	3.31
Age	5934	44.31	18.83	15	97	41.49
Gender (female)	5934	0.53	0.50	0	1	0.51
Country of origin: Denmark	5934	0.54	0.50	0	1	0.46
Country of origin: Western immigrant or descendant of a Western immigrant	5934	0.04	0.20	0	1	0.04
Country of origin: Non-Western immigrant (1st generation)	5934	0.34	0.47	0	1	0.40

[5] We have conducted the analysis including the number of violations of the law (in every 1,000 residents) reported to the police in each neighbourhood. The results confirm that dark numbers may be a problem. Thus, the higher the number of offenses against persons, robberies, theft from cars and sex offences, the higher is the perceived safety among the respondents. All the variables are insignificant, however.

Country of origin: Descendant of non-Western immigrant	5934	0.09	0.28	0	1	0.10
Highest level of education: Primary school	5934	0.49	0.50	0	1	0.52
Highest level of education: Secondary school	5934	0.08	0.28	0	1	0.09
Highest level of education: Vocational education	5934	0.24	0.43	0	1	0.22
Highest level of education: Higher education	5934	0.11	0.32	0	1	0.11
Highest level of education: Unknown education	5934	0.07	0.26	0	1	0.07
Employment status: Self-employed / executive	5934	0.02	0.14	0	1	0.02
Employment status: Employee	5934	0.38	0.49	0	1	0.35
Employment status: Unemployed	5934	0.05	0.22	0	1	0.06
Employment status: Disability pensioners	5934	0.12	0.33	0	1	0.12
Employment status: Social security	5934	0.06	0.23	0	1	0.09
Employment status: Child, youth or student	5934	0.10	0.30	0	1	0.13
Employment status: Other	5934	0.27	0.44	0	1	0.23
Household income: 1st income quintile	5934	0.15	0.35	0	1	0.20
Household income: 2nd income quintile	5934	0.21	0.40	0	1	0.20
Household income: 3rd income quintile	5934	0.22	0.41	0	1	0.21
Household income: 4th income quintile	5934	0.20	0.40	0	1	0.19
Household income: 5th income quintile	5934	0.23	0.42	0	1	0.21
Years in the neighbourhood	5934	3.33	1.25	0	4	3.10
Faith in the police	5934	0.81	0.40	0	1	0.78
The respondent has been exposed to violence	5934	0.02	0.15	0	1	0.02
The respondent has been subjected to burglary	5934	0.08	0.27	0	1	0.08
The respondent has been exposed to theft	5934	0.12	0.33	0	1	0.15
The respondent has experienced vandalism	5934	0.10	0.30	0	1	0.10
The respondent thinks the following are a problem in the neighbourhood:						
Threats	5934	0.25	0.43	0	1	0.27
Violence	5934	0.37	0.48	0	1	0.42
Drug and alcohol abusers in the street	5934	0.43	0.49	0	1	0.45
Sale of drugs and hashish	5934	0.34	0.48	0	1	0.36
Shouting in the street	5934	0.19	0.39	0	1	0.20
Trouble in the street	5934	0.29	0.45	0	1	0.34
Harassment by groups of young people	5934	0.37	0.48	0	1	0.37
Burglary or attempted burglary	5934	0.50	0.50	0	1	0.49
Theft of bicycles	5934	0.54	0.50	0	1	0.56
Vehicle theft	5934	0.23	0.42	0	1	0.25
Theft from a car	5934	0.29	0.45	0	1	0.31
Theft from bag and/or purse	5934	0.19	0.39	0	1	0.20
Graffiti	5934	0.40	0.49	0	1	0.39
Litter on the street	5934	0.46	0.50	0	1	0.49

Reckless moped riding	5934	0.59	0.49	0	1	0.60
Reckless driving	5934	0.37	0.48	0	1	0.38
Noise from other residents	5934	0.30	0.46	0	1	0.31
Neighbourhood level						
Share of men in the neighbourhood	35	49.45	1.95	44.84	52.82	-
The average age in the neighbourhood	35	34.08	3.50	27.57	42.21	-
Standard deviation in age in the neighbourhood	35	21.20	1.30	18.49	24.58	-
Share of non-Western immigrants (1st generation) in the neighbourhood	35	28.96	10.23	12.72	47.71	-
Share of descendants of immigrants from a non-Western country in the neighbourhood	35	19.68	8.04	5.66	38.22	-
Share of residents who have lived in the neighbourhood for at least 5 years	35	62.10	5.68	44.80	69.09	-
Share of residents from low-income households	35	22.30	8.12	9.49	44.72	-
Youth unemployment 6-8.5%	35	0.17	0.38	0.00	1.00	-
Youth unemployment 8.5-10%	35	0.29	0.46	0.00	1.00	-
Youth unemployment 10-12%	35	0.23	0.43	0.00	1.00	-
Youth unemployment 12-13.5%	35	0.17	0.38	0.00	1.00	-
Youth unemployment 13.5-20%	35	0.14	0.36	0.00	1.00	-
The neighbourhood's share of the electoral district	35	32.73	24.13	6.43	84.66	-
Turnout in municipal election	35	60.78	9.31	41.04	78.47	-
Share of respondents with faith in the police	35	80.32	3.98	70.93	86.84	79.84
Share of respondents exposed to violence	35	2.38	2.08	0.00	9.68	2.43
Share of respondents subjected to burglary	35	8.30	5.24	0.00	25.81	8.44
Share of respondents exposed to theft	35	11.93	3.05	4.26	16.14	12.58
Share of respondents who have experienced vandalism	35	10.45	5.35	4.84	26.29	10.64

Stepwise inclusion of independent variables

The independent variables are included in the model in four steps. This makes it possible to investigate how the variables mediate each other and to model the relationship between perceived neighbourhood disorder and the perceived safety latent class membership. Model I includes socioeconomic/structural background variables at the individual and neighbourhood levels. Model II introduces two interaction terms and variables related to the interaction terms. Model III includes a number of variables related to offences at the individual and neighbourhood levels, as well as variables regarding social trust. These variables are seen as occurring later in time compared to the variables in Models I and II. Finally, in model IV, which is reported separately, we rerun the full model specification in a latent class/FMM model including the perceived levels of neighbourhood disorders, though not in a multilevel model framework.

Limitations

The are a number of limitations to the analysis that should be addressed. First all, we do not include a variable for perceived safety related to the physical environment, though the actual and perceived upkeep of the area has been found to correlate with the fear of crime in some studies (Atkins et al., 1991; Fisher and Nasar, 1992; Hur and Nasar, 2014; Lorenc et al., 2013). Including information on the physical environment would improve on our analysis. Furthermore, we do not compare differences in neighbourhood relationships, as done in Swatt et al. (2013) and Vancluysen et al. (Vancluysen et al., 2011). Though we believe that it would be interesting to trace out potential differencs in perceived safety responses across areas, this is beyond the scope of the present paper.
Furthermore, given the nature of the data we were unable to add qualitative dimensions to the analysis. Having a qualitative dimension in the analysis could provide valuable insight into how people talk about and perceive crime, disorder and social relations between people living in the neighbourhoods and people living on the boundaries of the neighbourhoods. (Farrall et al., 1997; Jørgensen et al., 2016; Tulloch, 2000).

Empirical findings

Table 4 presents the empirical findings for the multilevel linear model. Each of the four models will be examined separately.

Model I

Model I in Table 4 contains all the variables relating to the respondents' background characteristics as well as the background characteristics of the neighbourhoods. At the individual level it can be seen that, on average, women feel significantly less safe in their neighbourhood than men. On average, a woman feels 3 percentage points less safe than a man (which corresponds to 0.18 points on a 7-point scale). These results are in line with the literature mentioned above.

Similarly, there is a significant relationship between the respondents' age and the perceived safety. Elderly and young people feel most safe on average, while residents around the age of 40 feel most unsafe. The literature has debated whether or not older people have a higher fear of crime, see (Chadee and Ditton, 2003) for a review, Our results are in line with (Chadee and Ditton, 2003; Ferraro and Lagrange, 1992), though we estimate a u-shaped curve as in Moore and Shepherd (2006; 2007).

Non-Western immigrants – and especially descendants of non-Western immigrant – feel significantly safer than native Danes do. On average, respondents who are descendants of non-Western immigrants feel approximately 9 percentage points (or 0.67 points on the 7-point scale) more safe in their neighbourhood than their Danish counterparts.

None of remaining the variables on the individual level have any significant relationship with the perceived safety. This includes all the variables related to the respondent's human capital, such as education and occupation. Apparently, the amount of human capital carried by the respondents does not correlate with the perception of safety. This is somewhat surprising, as especially income and education as mentioned correlate with fear of crime in other studies.

Moving on to the neighbourhood variables, the variable used as a proxy of social trust (number of years in the neighbourhood) has a positive and significant relationship with the respondents' perceived safety. In the neighbourhoods with the largest share of permanent residents (69.1 per cent of the residents) – i.e. the share of the residents who have lived in the neighbourhood for at least 5 years – the average perception of safety is 32 percentage points higher than in the neighbourhoods with the lowest share of permanent residents (44.8 percentages of the residents).

Interestingly, the average age in the neighbourhoods correlates significantly with the respondents' level of perceived safety. Thus, a high average age is associated with lower levels of perceived safety. In the neighbourhood with the lowest average age (27.6 years), the respondents feel 22 percentage points more safe on average than the respondents in the neighbourhood with the highest average age (42.2 years). Interestingly, as we will return to below, Model II shows that the relationship between the average age in the neighbourhood and the perceived safety is subject to how well the average age represents the age distribution in the neighbourhoods.

The share of non-Western immigrants in the neighbourhood correlates significantly with the perception of safety. The higher the share of immigrants, the higher is the level of perceived safety. However, the model also indicates that there is a significant negative relationship between the share of descendants of non-Western and the perception of safety. Higher shares of non-Western immigrants correlate with higher shares of descendants. Accordingly, and importantly, the combined relationship between the share of non-Western immigrants (both 1st and 2nd generation) and perception of safety is negative, due to the much larger estimated parameter for the descendants[6]. Respondents living in the neighbourhoods with the highest proportion of low-income households (44.7 per cent of the households) feel 29 percentage points more safe, on average, than respondents living in the neighbourhoods with the lowest proportion of low-income households (9.5 per cent of the households). The share of men in the neighbourhood correlates significantly and positively with the perceived safety. On average, respondents living in the neighbourhood

[6] Models including the share of non-Western immigrants only, the share of descendants and the cumulative share of non-Western immigrants and their descendants have been estimated. The models confirm the results. In Model I, the estimated parameter is numerically small and only significant on a 95% level of confidence. This suggests only a moderate negative relationship between the share of non-Western immigrants and the perception of safety. The same seems to be evident in the model for the cumulative variable. In the model including the share of non-Western descendants only, however, the parameter estimate is in the same range as the results in the Table 4 (except for the non-Western immigrant parameter estimate in Table 4). This suggests that it is primarily the share of the descendants, which correlates negatively with the perception of safety.

with the largest share of men (52.8 per cent of the population) feel 9 percentage points more safe than respondents living in the neighbourhood with the lowest share of men (44.4 per cent).
The results in the table also indicate that neighbourhoods with a medium degree of youth unemployment have the lowest perceived safety among the residents. Finally, there is no significant relationship between a neighbourhood's turnout for local elections and the perceived safety. The "true" significance of this variable is explored in Model II, however.

Table 4: Multilevel results

	Model I	**Model II**	**Model III**
Individual level			
Gender			
Man	Ref.	Ref.	Ref.
	(.)	(.)	(.)
Woman	-0.18***	-0.18***	-0.22***
	(0.05)	(0.05)	(0.05)
Age	-0.05*	-0.05*	-0.03*
	(0.02)	(0.02)	(0.02)
Age^2	0.0006***	0.0006***	0.0004**
	(0.00)	(0.00)	(0.00)
Place of origin			
Denmark	Ref.	Ref.	Ref.
	(.)	(.)	(.)
Western immigrant or descendant of Western immigrant	0.12	0.12	0.08
	(0.16)	(0.16)	(0.15)
Non-Western immigrant (1st generation)	0.32***	0.33***	0.16*
	(0.09)	(0.09)	(0.08)
Descendant of non-Western immigrant	0.67**	0.67**	0.55*
	(0.22)	(0.22)	(0.21)
Highest level of education			
Primary school	Ref.	Ref.	Ref.
	(.)	(.)	(.)
Secondary school	-0.01	-0.03	-0.0002
	(0.10)	(0.10)	(0.10)
Vocational education	0.08	0.07	0.11
	(0.07)	(0.07)	(0.07)
Higher education	0.03	0.03	0.06
	(0.08)	(0.08)	(0.08)
Unknown education	0.02	0.02	-0.0007
	(0.10)	(0.10)	(0.09)
Employment status			
Self-employed / executive	0.09	0.10	0.20
	(0.23)	(0.23)	(0.16)
Employee	Ref.	Ref.	Ref.

	(.)	(.)	(.)
Unemployed	0.31	0.31	0.27
	(0.19)	(0.20)	(0.18)
Disability pensioners	-0.08	-0.08	-0.13
	(0.13)	(0.13)	(0.10)
Social security	0.13	0.13	0.10
	(0.15)	(0.15)	(0.15)
Child, youth or student	-0.00	-0.01	0.02
	(0.17)	(0.17)	(0.15)
Other	-0.07	-0.07	-0.05
	(0.11)	(0.11)	(0.14)
Household income			
1st Income quintile	Ref.	Ref.	Ref.
	(.)	(.)	(.)
2nd Income quintile	-0.05	-0.05	-0.08
	(0.13)	(0.13)	(0.14)
3rd Income quintile	-0.01	-0.01	-0.07
	(0.10)	(0.10)	(0.11)
4th Income quintile	0.10	0.10	0.04
	(0.10)	(0.10)	(0.10)
5th Income quintile	-0.07	-0.07	-0.16
	(0.12)	(0.12)	(0.13)
Years in the neighbourhood	0.03	0.03	0.02
	(0.03)	(0.03)	(0.02)
Neighbourhood level			
Share of men in the neighbourhood	0.07*	0.07*	0.10**
	(0.03)	(0.03)	(0.03)
Share of non-Western immigrants (1st generation) in the neighbourhood	0.01	0.04**	0.03***
	(0.01)	(0.01)	(0.01)
Share of descendants of non-Western immigrants in the neighbourhood	-0.11***	-0.13***	-0.09***
	(0.02)	(0.02)	(0.02)
Share of residents who have lived in the neighbourhood for at least 5 years	0.08***	0.04**	0.02
	(0.02)	(0.01)	(0.01)
Youth unemployment			
Youth unemployment 6-8.5%	Ref.	Ref.	Ref.
	(.)	(.)	(.)
Youth unemployment 8.5-10%	-0.35*	-0.37*	-0.38*
	(0.17)	(0.16)	(0.16)
Youth unemployment 10-12%	-0.24	-0.26	-0.19
	(0.20)	(0.17)	(0.17)
Youth unemployment 12-13.5%	-0.04	-0.23	-0.05
	(0.24)	(0.22)	(0.19)

Youth unemployment 13.5-20%	0.03	0.07	-0.05
	(0.23)	(0.19)	(0.16)
Share of residents from low-income households	0.05**	0.04**	0.02*
	(0.02)	(0.01)	(0.01)
Turnout in municipal election	-0.00	-0.03**	-0.02*
	(0.01)	(0.01)	(0.01)
The average age in the neighbourhood	-0.09*	-0.81***	-0.58*
	(0.04)	(0.23)	(0.23)
The neighbourhood's share of the electoral district		-0.05***	-0.04***
		(0.01)	(0.01)
Standard deviation in age in the neigbourhood		-1.12**	-0.82*
		(0.39)	(0.39)
Average age X Standard deviation in the average age		0.03**	0.02*
		(0.01)	(0.01)
Turnout X Share of electoral district		0.001***	0.0007**
		(0.00)	(0.00)
Faith in the police			0.41***
			(0.09)
The respondent has been exposed to violence			-1.29***
			(0.25)
The respondent has been subjected to burglary			-0.88***
			(0.14)
The respondent has been exposed to theft			-0.60***
			(0.08)
The respondent has experienced vandalism			-0.74***
			(0.13)
Share of the respondents with faith in the police			-0.01
			(0.01)
Share of the respondents exposed to violence			-0.06*
			(0.03)
Share of the respondents exposed to burglary			0.01
			(0.02)
Share of the respondents exposed to theft			-0.01
			(0.01)
Share of the respondents who have experienced vandalism			-0.01
			(0.01)
Constant	1.54	29.32**	21.85**
	(2.77)	(8.93)	(8.12)
Random effects (s^2)			
Level 1 (θ)	θ =3.27 R^2 =0.03	θ =3.27 R^2 =0.03	θ =2.93 R^2 =0.13
Level 2 (ψ)	ψ =0.06 R^2 =0.73	ψ =0.03 R^2 =0.86	ψ =0.02 R^2=0.92

Rho	0.02	0.01	0.01
N	**5934**	**5934**	**5934**

Note: * p < 0.05, ** p < 0.01, *** p < 0.001. Standard errors in parentheses.

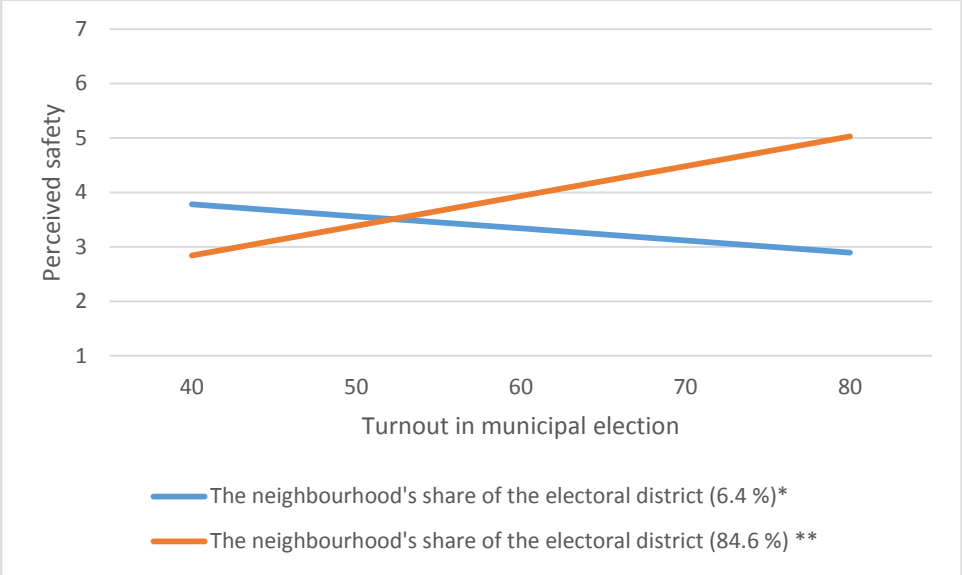
Variance in the (weighted) unconditional model ψ =0.235 Ø=3.376 P=0.0651. Calculated as R^2_level1 = (θ _unconditional – θ_conditional)/ θ _unconditional and R^2_level2 = (ψ _unconditional- ψ _conditional)/ ψ _unconditional.

Model II: Interaction terms

Model II includes the two interactions terms.

Firstly, the interaction term measuring the cross-product of turnout at the last municipal elections and the neighbourhood's share of the electoral district is significant and positive. Figure 2 shows a positive relationship between a high turnout and perceived safety, when the neighbourhood constitutes a large fraction of the electoral district. On average, the perceived safety is 2 points (or 34 percentage points) higher on the 7-point scale in the neighbourhoods with the highest turnout compared to the neighbourhoods with the lowest turnout.

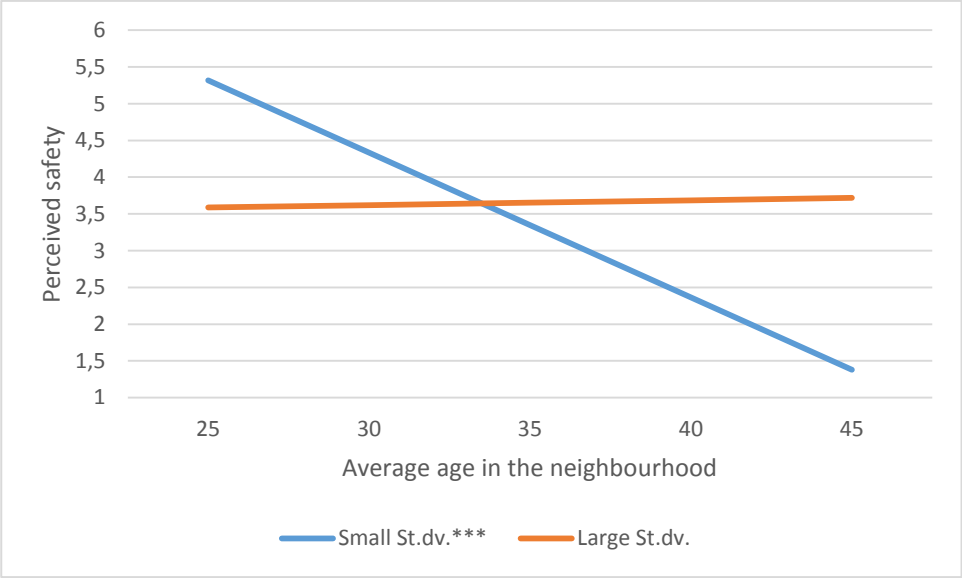
Figure 2: The relationship between turnout level and perceived safety.



Note: N = 5.934. * p < 0.05, ** p < 0.01, *** p < 0.001. The level of significance indicates whether the slope of the line is significantly different from zero at the current level of the neighbourhood's share of the electoral district.

Moreover, the interaction term between average age in the neighbourhoods and the standard deviation of the average age is significant. This means that there only seems to be a relationship between the average age in the neighbourhoods and perceived safety, if the average age is a good estimate of the typical age in the neighbourhood (i.e. when the standard deviation is small). When the standard deviation is large, the estimated relationship between the average age and the perception of safety is not significant, see Figure 3.

Figure 3: The relationship between average age in the neighbourhoods and perceived safety



Note: N = 5.934., *** p < 0.001- the level of significance indicates whether the slope of the line represents a significant difference from zero at the current standard deviation.

Finally, the share of non-Western immigrants (1st generation) becomes significant in Model II. However, in contrast to the share of descendants of immigrants from a non-Western background in the neighbourhood, this variable correlates positively with the perceived safety among the respondents in the neighbourhood.

Model III: Offences and social trust

Model III includes all the variables regarding offences and faith in the police.

Overall, the results from Model III demonstrate that both crime and social trust correlate with the respondents' perceived safety. Respondents who have been exposed to violence, burglary, theft or vandalism show a perceived safety that is between 0.6 and 1.29 points lower than the respondents, who have not been exposed to violence, burglary, theft or vandalism on the 7-point scale (which corresponds to between 10 and 21.5 percentage points). Similar differences between violent crime and property-related crimes are also found in Yun et al. (2010). Likewise, the larger the share of residents exposed to violence in a neighbourhood, the lower is the perceived safety. In the neighbourhoods with the largest share of residents who have experienced violence (9.7 per cent of the respondents' reports), the average perception of safety is approximately 10 percentage points lower than in the neighbourhoods with the lowest share (0.0 per cent of the respondents). On the other hand, none of the other types of crime have any significant relationship with the perception of safety. This may indicate that only the crime level for types of crime that are highly visible in the neighbourhood affect the perception of safety.

Furthermore, the amount of social trust at the individual level correlates positively to the perception of safety. On average, respondents who have faith in that the police will help if he/she is in need feel 7 percentage points safer. However, there does not seem to be a relationship between the share of residents with faith in the police and perceived safety. This suggests that there are no neighbourhood relationships from trust in that the police will help if the respondent is in need of help.

Besides the finding regarding the variables included in Model III, the results also reveal that a number of variables included in Model I and Model II are mediated by the variables included in Model III. In other words, the coefficients of the variable measuring country of origin at the individual level are nearly halved. The same is true for the share of low-income families, while the share of permanent residents in the neighbourhood loses its significance altogether. The latter result may be due to the fact that both the share of permanent residents in the neighbourhoods and faith in police are believed to measure the same underlying concept.

Model IV: Neighbourhood disorders

The results from the latent class Model are presented in Table 5 below. The full model can be found in Appendix C. In the table, we have only included the parameter estimates for the class membership function. The class membership function is a binary logit model equal to 1, if the respondent belongs to Class I and 0 if the respondent belongs to Class II. The model estimates the probability of belonging to Class I conditional on the class segmentation. The estimated perceived safety in the two classes is characterised by an expected average level for perceived safety of 4.07 in Class I and 6.58 for Class II. We therefore label the two classes as "Neither Unsafe/Safe" (Class I) and "Very Safe" (Class II). The share of respondents in Class I is 46.76 % and 54.24 % in Class II. It is important to note that the estimated parameters do not uniquely determine that, for instance, respondents who think threats are a problem are always "Safe" or "Very Safe". The model only estimates a probability parameter that denotes whether a respondent who sees threats as a problem has a higher or lower probability of being in the "Safe" or "Very Safe" class.

Table 5. The probability of belonging to Class 1, given the perception of neighbourhood problems

Variables	**Logit parameter estimate**
The respondent sees the following as a problem in the neighbourhood	
Threats	0.45***
	(0.09)
Violence	0.41***
	(0.07)
Drug and alcohol abusers in the street	0.29**
	(0.09)
Sale og drugs and hashish	-0.18*
	(0.08)
Shouting in the street	0.30**
	(0.11)
Trouble in the street	0.41***
	(0.08)
Harassment by groups of young people	0.81***
	(0.08)

Burglary or attempted burglary	0.41***
	(0.09)
Theft of bicycles	0.04
	(0.07)
Vehicle theft	0.13
	(0.07)
Theft from cars	0.06
	(0.08)
Theft from bags or purses	0.28*
	(0.11)
Graffiti	-0.18*
	(0.07)
Litter in the street	0.15
	(0.08)
Reckless moped riding	0.03
	(0.09)
Reckless driving	0.04
	(0.09)
Noise from other residents	0.42***
	(0.07)
Constant	-1.38***
	(0.07)

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses.

First of all, the strongest predictor of class membership is a respondent reporting harassments from groups of young people. Estimated on the margin, If a respondents perceive this as a neighbourhood problem, he/she has a 16% higher probability of being in the Class I (Neither Unsafe/Safe) relative to Class II (Very Safe). This is followed by a group of items “Threats”, “Violence”, “Trouble in the street”, “burglary or attempted burglary” and “Noise from neighbours” who have a 7-8 % probability of being in Class I relative to Class II. A third group with an app. 5 % higher probability to be in Class I includes “Shouting in the street”, “Drug addicts and alcohol abusers in the street” and “Theft from bags and purses”. All these perceived/reported types of disturbances have a positive influence on the probability of being in the “Safe” relative to the “Very Safe” Class, and vice versa. Perceiving “Theft of bicycles”, “Theft from vehicles”, “Vehicle theft”, “Litter in the street”, “Reckless moped riding” and “Reckless driving” as a problem in the neighbourhood does not have a significant influence on the probability of being in Class I or II. However, interestingly the results also suggest that having observed “Graffiti” and “Sale of drugs and hashish” has the opposite effect on class probability (app- 2.5 % lower probability). This indicates that though neighbourhood disorder might generally increase the probability of feeling safe, the relationships are heterogeneous.

Test of robustness

As mentioned earlier in this paper, one could argue that our outcome variable “Perceived safety” is not indeed a metric variable, because the variable is measured using a 7-point discreet scale. Therefore, we have conducted a test of robustness using an ordered logistic model. This model shows almost the same results as those presented above. However, the interaction term between average age in the neighbourhoods and the standard deviation of the average age is only significant at $p<0.1$. Moreover, the share of residents experiencing vandalism becomes significant and positive, while the share of the respondents exposed to violence becomes insignificant. In addition, we have conducted a test of robustness where data are not weighted. The robustness analysis shows almost identical results to the ones presented above. The share of residents experiencing vandalism becomes significant and positive, while youth unemployment becomes insignificant.

Discussion

In our analysis, we have several findings that are in accordance with the general literature. These have already been commented on in the results section. In the discussion section, we therefore consider some of the more novel and deviating results.

In the models, we find a positive relationship between the shares of men in the neighbourhood and the level of perceived safety. From a female perspective, higher shares of males could pull in either a negative (potential higher number of sexual offenders) or a positive direction (higher level of protection). However, we do not find any significant relationships between gender and gender distribution. Clearly, qualitative information such as personal or focus group interviews would be of great help in obtaining a better indication of what drives the gender distribution and perceived safety relationships. That said, the results provide potential new knowledge related to the gender and fear discussion in the literature, in that it is not merely the gender itself that correlates with perceived safety but also the gender distribution in the area people live in.

A new finding is the relationship between voter turnout and perceived safety. Coleman (2002) finds a conformity relationship between voter turnout and crime. We do not find a u-shaped function, which would have suggested that higher levels of conformity (low or high levels of voter turnout) correlate with higher levels of perceived safety. Conditional on a higher share of voters from the vulnerable neighbourhood in the electoral ward, we find a positive relationship – higher voter turnout-higher safety. Accordingly, the link function does not seem to follow a conformity relation. However, neighbourhoods with a high amount of social capital (strong social ties, good neighbourhood relations and social participation) have generally a much lower level of perceived safety/fear of crime (e.g. Lindström et al. 2003). Looking at the social capital literature, Brehm and Rahn (1997) find that civic engagement and interpersonal trust correlate significantly. The movement from engagement to trust seems to be

particularly strong. Accordingly, we could expect, as indicated by the results, that higher voter turnouts might increase the interpersonal level of trust, which in turn would lead to higher efficacy/cohesion in the neighbourhood. However, it is also important to make a clear statement in relation to our findings. Given that we do not cover the electoral wards entirely in each vulnerable neighbourhood, the data are not as strong as we would have liked them to be. However, the results point towards an interesting relationship that calls for further exploration.

Another interesting result is the relationship between the shares of non-Western immigrants and their children. The results strongly indicate that while higher shares of 1st generation non-Western immigrants seem to be weakly correlated to higher levels of perceived safety, while the opposite seems to be the case for the share of 2nd generation non-Western immigrants. It is worth noting that these results are significant even when we control for the level of youth unemployment, which could capture the effect of a higher share of unemployment among young peoples in the socially vulnerable areas. To our knowledge, such results have not been found previously, though the effect of changes in, for example, youth and minorities have been found to increase fear (Taylor and Covington, 1993). These results could thus help to put into perspective some of the findings that higher shares of non-native (Vancluysen et al., 2011) or non-EU persons (Hooghe and De Vroome, 2016) increase fear of crime.

A key finding is the relationship between victimisation and perceived safety. The more serious the type of offense that a respondent has experienced, the larger an impact it has on the perceived safety. These results are much in line with the literature. However, we also find that the level of violent offenses on the neighbourhood level correlates with lower levels of perceived safety, while exposure to other types of crime (burglary, theft and vandalism) does not seem to carry over to the neighbourhood level. This suggests that the knowledge of offenses experienced seeps to the neighbourhood and thereby gives further reasons for lower perceived safety. Accordingly, resources invested in mitigating crime will make both the person exposed to violence *and* the rest of the population in the area feel more safe. For example, in one of the neighbourhoods, as many as 9.68 per cent have been exposed to violence. If this figure was reduced to the mean of the 31 neighbourhoods (2.38 per cent), the contribution from the neighbourhood relationships would be an increase in the perceived safety of 0.43 on the 7 point scale.

Finally, it is also worth addressing the findings related to the latent class model. Where other studies have used a factor analysis approach or/and sequential equation model approach we estimate the potential relation between perceived safety and perceived disorders using a latent class (finite mixture) model. In the model, the relationship between perceived disorders is estimated as a probability of belonging to one of the two classes. As in the literature, we generally find that the higher the levels of perceived disorders, the lower perceived safety is, which is expressed by a higher probability of being a member of the class of respondents with the lowest perceived safety. Interestingly, the “problem” that influences the probability the most is “Harassment by groups of young people“, suggesting that the youth in the neighbourhoods may be drivers of perceived safety. However, our models including the distribution of age on the neighbourhood level suggest the opposite. This illustrates the differences in how people might perceive “Harassment by

young people" and indicates that it is how the young people act and not their presences that correlates with perceived safety.

Conclusion

Based on the stated level of perceived safety among a sample of 5,934 respondents living in 31 socially vulnerable neighbourhoods, we apply multilevel and latent class models to estimate the relationships between perceived safety and a broad range of variables from survey and administrative registry data. We find that women feel less safe and that higher shares of males in the neighbourhoods seems to increase the perception of safety. Interestingly, we find non-linear effects from the distribution of age in the neighbourhood. The tighter the age distribution, the less safe the respondents feel with increasing average age and vice versa. However, if the age distribution is relatively wide, the average age does not seem correlate with the perceived safety. Focusing on ethnicity, individuals (1st and 2nd generation) from non-Western countries stated higher levels of perceived safety. However, we find that the share of 2nd generation non-Western immigrants in the neighbourhood appears to decrease the perceived safety, while higher shares of first generation immigrants seems slightly to increase the perceived safety. Due to a strong positive correlation between the share of 1st and 2nd generation non-Western immigrants, the combined relationship of higher shares of 1st and 2nd generation non-Western immigrants and the perceived safety is negative. We do not find any significant relationships between education, income, employment status and perceived safety. However, we find that higher shares of low-income households increase the perceived safety. Direct victimisation decreases perceived safety proportional with the severity of the crime. This also carries over to the neighbourhood level. Higher shares of respondents being exposed to violence correlate negatively with lower levels perceived safety. We find several indications of social trust and perceived safety relationships. Firstly, though we do not find a significant relationship between the number of years in the neighbourhood and the level of perceived safety on an individual level, larger shares of residents who have lived in the neighbourhood for at least five years is associated with higher levels of perceived safety. Furthermore, we find that faith in that the police will help if the respondent is in need seems to increase safety and some indications of higher voter turnout correlates positively with the perceived safety. Finally, using a latent class approach we find that perceived neighbourhood disorders is negatively associated with the probability of feeling "Safe" or "Very Safe". In line with the literature, this indicates that reducing the level of neighbourhood disorders might have a positive effect on the level of perceived safety.

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Appendix A: Comparison of respondents participating and not participating in the survey (* denotes significant differences in the samples)

Variables	Participating in survey	Not participating in survey
Gender (female)	52.67 %*	50.41 %
Age (mean)	44.34***	42.48
Place of origin		
Denmark	53.42 %***	39.12 %
Western immigrant or descendant of Western immigrant	4.28 %**	5.53 %
Non-Western immigrant (1st generation)	33.67 %***	46.31 %
Descendant of non-Western immigrant	8.63 %	9.04 %
Household income (mean)	191.973***	175.703
Highest level of education		
Primary school	49.16 %***	53.27 %
Secondary school	8.43 %	7.59 %
Vocational education	24.05 %***	18.86 %
Higher education	11.18 %***	7.46 %
Unknown education		7.18 %***
Employment status		
Self-employed / executive	2.06 %	2.41 %
Employees	37.9 %***	30.46 %
Unemployed	4.93 %*	5.83 %
Disability pensioners	12.52 %***	17.03 %
Social security	5.69 %***	10.63 %

Child, youth or student	10.07 %***	7.57 %
Other	26.82 %	26.09 %
N	5,958	5,562

Note: Significant differences between effective and original samples * p < 0.05, ** p < 0.01, *** p < 0.001. Standard errors in parentheses.

Appendix B: Conceptualisation of the variables in the models

Independent variables on the individual level			
Theoretical concept	**Variables**	**Conceptualisation**	**Data source**
Social trust	Faith in the police	Indicates whether or not the respondent has answered "Yes" to the question: "I feel confident that the police would help me if needed"	Survey
	Years in neighbourhood	Number of consecutive years that the respondent has lived in the neighbourhood	Adm. data
Direct personal offences	Exposed to violence, burglary, vandalism or theft	In total, four variables indicate whether or not the respondent personally has been exposed to: violence, burglary, vandalism or theft	Survey
Perception of neighbourhood disorder	16 types of neighbourhood disorder	In total, 16 variables indicate whether or not the respondent thinks the following is a problem in the neighbourhood: 1) Threats, 2) Violence, 3) Drug/alcohol abusers in the street, 4) Sale of drugs and hashish, 5) Shouting in the street, 6) Trouble in the street, 6) Inconvenience caused by groups of young people, 7) Burglary or attempted burglary, 8) Theft of bicycle, 9) Vehicles theft, 10) Theft from car, 11) Theft from a bag or purse, 12) Graffiti, 13) Litter in the street, 14) Reckless moped riding, 15) Reckless driving, 16) Noise from other residents	Survey
Background information	Gender		Adm. Data
	Age	The age of the respondent and the squared age due to a nonlinear relation with the outcome variable	Adm. Data
	Place of origin	Indicates whether the respondent is Danish, an immigrant from a Western country, a first generation immigrant for a non-Western country or a descendant of an immigrant from a non-Western country	Adm. data
Human Capital	Level of education	Measures the highest completed level of education	Adm. Data
	Employment status	Measures the primary relation to the labour market	Adm. data
Financial capital	Household income	Measures the equivalised income of the household, i.t. the household income calculated as the total income of the household corrected for the number of adults and children in the household	Adm. Data

Independent variables on the individual level			
Theoretical concept	**Variables**	**Conceptualisation**	**Data source**
Human capital and collective empowerment	Electoral turnout	Share of eligible voters in the electoral districts who voted at the last municipal election	Adm. data
		Neighbourhood's share of electoral district	Adm. data
	Share of permanent residents	Share of the residents who have been living in the neighbourhood for at least 5 years	Adm. data
Social trust	Faith in the police	Share of the respondents who feel confident that the police would help if needed	Survey
Level of crime	Share exposed to crime	Share of the respondents who have experienced: violence, burglary, vandalism or theft	Survey
Other characteristics of the neighbourhood	Share of men	Share of male residents in the neighbourhood	Adm. data
	Share of immigrants	Share of non-Western immigrants (1st generation)	Adm. data
		Share of descendant of immigrant from non-Western countries	
	Youth unemployment	Calculated as the number of unemployed residents aged 16-24 divided by the total number of residents of the same age in the neighbourhood	Adm. data
	Average age in the neighbourhood	The average age of all the residents in the neighbourhood	Adm. data
	Share of low-income households in the neighbourhood	Share of the residents who have a household income in the lower (1st) quintile	Adm. data

Note: "Adm. data" – Administrative data supplied by Statistics Denmark. "Survey" – Survey data supplied by The Danish National Police.

Appendix C: Latent Class/FMM model

	Neither Unsafe/Safe class	**Very safe class**
<u>Individual level</u>		
Gender		
Male	Ref.	Ref.
	(.)	(.)
Female	-0.02	-0.01*
	(0.02)	(0.00)
Age	-0.00	0.00
	(0.00)	(0.00)
Age^2	0.00	-0.00

	(0.00)	(0.00)
Place of origin		
Denmark	Ref.	Ref.
	(.)	(.)
Western immigrant or descendant of Western immigrant	0.05	0.02*
	(0.05)	(0.01)
Non-Western immigrant (1st generation)	-0.04	0.03***
	(0.03)	(0.00)
Descendant of non-Western immigrant	-0.02	0.04***
	(0.05)	(0.01)
Highest level of education		
Primary school	Ref.	Ref.
	(.)	(.)
Secondary school	0.02	-0.02**
	(0.03)	(0.01)
Vocational education	0.07*	-0.01***
	(0.03)	(0.00)
Higher education	0.05	-0.01
	(0.04)	(0.00)
Unknown education	-0.08	-0.00
	(0.06)	(0.00)
Employment status		
Self-employed / executive	0.03	0.01
	(0.07)	(0.01)
Employee	Ref.	Ref.
	(.)	(.)
Unemployed	-0.09	0.01
	(0.06)	(0.01)
Disability pensioner	-0.06	0.01*
	(0.03)	(0.00)
Social security	0.04	0.01*
	(0.06)	(0.01)
Child, youth or student	0.08	0.00
	(0.04)	(0.00)
Other	-0.03	0.02**
	(0.04)	(0.00)
Household income		
1st income quintile	Ref.	Ref.
	(.)	(.)

2nd income quintile	-0.02	-0.01
	(0.05)	(0.00)
3rd income quintile	0.01	-0.00
	(0.05)	(0.00)
4th income quintile	0.05	-0.00
	(0.04)	(0.00)
5th income quintile	0.04	-0.00
	(0.04)	(0.00)
Years in the neighbourhood	0.01	0.00
	(0.01)	(0.00)
Share of men in the neighbourhood	0.01	0.00
	(0.01)	(0.00)
The average age in the neighbourhood	-0.30***	-0.01
	(0.07)	(0.01)
Standard deviation in the age in the neighbourhood	-0.40**	-0.02
	(0.13)	(0.01)
Mean age X Standard deviation of the age	0.01***	0.00
	(0.00)	(0.00)
Share of non-Western immigrants (1st generation) in the neighbourhood	0.00	0.00*
	(0.00)	(0.00)
Share of descendants of non-Western immigrants in the neighbourhood	-0.01*	-0.00
	(0.01)	(0.00)
Share of residents who have lived in the neighbourhood for at least 5 years	0.00	-0.00
	(0.00)	(0.00)
Youth unemployment		
Youth unemployment 6-8.5%	Ref.	Ref.
	(.)	(.)
Youth unemployment 8.5-10%	-0.04	-0.02***
	(0.04)	(0.00)
Youth unemployment 10-12%	-0.12**	-0.01***
	(0.04)	(0.00)
Youth unemployment 12-13.5%	-0.03	-0.01**
	(0.05)	(0.00)
Youth unemployment 13.5-20%	0.05	-0.01*
	(0.04)	(0.00)
Share of residents from low-income households	-0.00	0.00***
	(0.00)	(0.00)
The neighbourhood's share of the electoral district	-0.01*	-0.00

	(0.00)	(0.00)
Turnout in municipal election	-0.00*	-0.00
	(0.00)	(0.00)
Turnout X share of electoral district	0.00*	0.00
	(0.00)	(0.00)
Faith in the police	0.17***	0.00
	(0.03)	(0.00)
The respondent has been exposed to violence	-0.11	-1.16***
	(0.07)	(0.01)
The respondent has been exposed to burglary	-0.17***	-0.01
	(0.04)	(0.01)
The respondent has been exposed to theft	-0.10***	-0.02**
	(0.03)	(0.01)
The respondent has experienced vandalism	-0.10**	-0.04***
	(0.03)	(0.01)
Share of the respondents with faith in the police	0.00	-0.00
	(0.00)	(0.00)
Share of the respondents exposed to violence	-0.01	0.00
	(0.01)	(0.00)
Share of the respondents exposed to burglary	0.01	-0.00
	(0.00)	(0.00)
Share of the respondents exposed to theft	0.00	-0.00
	(0.00)	(0.00)
Share of the respondents who have experienced vandalism	-0.00	-0.00***
	(0.00)	(0.00)
Constant	10.30***	2.19***
	(2.77)	(0.21)
N	5,934	
Number of clusters	31	
Share of sample	46.76	54.24
Predicted component means	4.07	6.58

Notes: * p < 0.05, ** p < 0.01, *** p < 0.001. Standard errors in parentheses.