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Fear of Crime in the EU-15 and Hungary

Assessing the Impact of the Vulnerability, Victimization and Incivilities Model of the Fear of Crime in a European Cross-National Context

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Executive summary

Objectives. In spite of 40 years of research into the fear of crime, numerous questions on the measurement and the theoretical models explaining fear of crime remain. The current study addresses both and adopts an alternative fear of crime question structure while examining the efficacy of the vulnerability, victimization and incivilities model for explaining fear of crime. In particular, this study considers the impact of individual- and country-level characteristics on the prevalence, frequency and intensity of fear of crime. As such, it aims to advance the theoretical and empirical understanding of the fear of crime and related theoretical models.

Design. Cross-sectional multilevel study. Three level binary logistic modeling, three level negative binomial modeling and three level ordered multinomial logistic modeling are applied to analyze data from the European Crime and Safety Survey 2005. This survey contains information on personal characteristics (such as age, sex and household income), experiences with victimization, crime prevention, law enforcement and feelings of safety and security.

Setting. EU-15 and Hungary.

Main outcome measures. Fear of crime prevalence (0 = no, 1 = yes), fear of crime frequency (count) and fear of crime intensity (1 = not very fearful, 2 = a little bit fearful, 3 = quite fearful, 4 = very fearful).

Results. Fear of crime is not widespread in the EU-15 and Hungary. With regards to fear of crime prevalence it was found that the elderly and the economic advantaged are less likely to experience fear of crime, whereas females, victim of personal and property crimes and those perceiving incivilities are more likely to experience fear of crime. No contextual effects were found. With regards to fear of crime frequency results suggest that the elderly, victims of property and personal crimes are more likely to frequently experience fear of crime. Moreover, it was found that country-level victimization risk affects the frequency with which one feels fearful of crime. Finally, with regards to fear of crime intensity results indicate that women and the economic advantaged are less likely to intensely experience fear of crime, whereas victims of property and personal crimes and those perceiving incivilities are more likely to experience fear of crime more intensely. No contextual effects were found.

Conclusions. This study demonstrated that all three individual-level models are significantly associated with experiencing fear of crime and additionally showed that the basic argumentations of the victimization and incivilities model can be extended with regard to the frequency and intensity of experienced fear of crime. The arguments of the vulnerability model, however, are only to a very limited extent applicable to the frequency and intensity of fear of crime. The results also indicated that victimization is a consistent predictor of fear of crime prevalence, frequency and intensity, suggesting that future research should continue examining the victimization-fear nexus.

Keywords. Fear of crime, vulnerability, victimization, incivilities, multilevel.

1 Introduction

Fear of crime can have a detrimental impact on the quality of individual and community life and is considered a social problem worth researching in its own right (Hale 1996; Zedner 1997). Although a considerable amount of studies have indeed been undertaken in the last 40 years to gain more insight in the fear of crime, most of these studies are flawed because they make use of vague global measures of fear of crime that cannot fathom its complexity (Ferraro & LaGrange 1987; Gray, Jackson & Farrall 2008). Instead of recycling these defective operationalizations, a more comprehensive understanding of the fear of crime can be achieved by adopting an alternative question design that delivers insight in the prevalence, frequency and intensity of fear of crime (Farrall & Gadd 2004; Farrall 2004; Gray, Jackson & Farrall 2008). Notwithstanding these measurement concerns, numerous theoretical models that focus on explaining fear of crime have been developed. Of these models, three are of particular interest here: the vulnerability, victimization and incivilities model (cf. infra).

The purpose of the current study is to examine the efficacy of these three 'classical' theoretical models in light of an alternative question design of fear of crime (cf. Farrall & Gadd 2004; Farrall 2004; Gray, Jackons & Farrall 2008). This study initially assesses the prevalence of fear of crime, as well as the number of times people feel fearful (frequency) and the amount of experienced fear of crime (intensity). Thereby providing some details on the extent to which fear of crime is present in day to day life. The main goal of this paper is, however, to explore how vulnerability variables, experienced victimization and the perception of incivilities relate to these new fear of crime measures. More specifically, the current study considers the impact of individual- and country-level characteristics on the prevalence, frequency and intensity of fear of crime. By doing so, this article will advance the theoretical and empirical understanding of the three considered theoretical models as well as the fear of crime.

2 Theoretical framework

2.1 Fear of crime: concept and measurement

Generally speaking, two broad categories of conceptualizations of fear of crime can be distinguished (Ferrraro & LaGrange 1987; Ferraro 1995; Pleysier 2009). On the one hand, one can opt for a narrow interpretation of fear of crime that essentially corresponds with Ferraro & LaGrange's (1987: 73) classic definition of fear of crime as 'the emotional reaction arising from crime or symbols that a person associates with crime' (see also Ferraro 1995; Pleysier 2009). On the other hand, following among others Fattah & Sacco (1989), Gabriel & Greve

(2003) and Greve (1998), one can choose for a broad interpretation of fear of crime that emphasizes the multidimensional structure of the central concept. A broad interpretation then comprises a cognitive, emotional and behavioral dimension of fear of crime. The cognitive dimension precedes the actual emotional reaction and captures the individuals' assessment of the likelihood of becoming a crime victim. The behavioral dimension follows after the emotional dimension and focuses on what individuals claim to do in reaction to their experienced (fear of) crime.

Although previous research has demonstrated that opting for a broad interpretation of fear of crime proves insightful (see for example Franklin, Franklin & Fearn 2008; Greve 1998; Kanan & Pruitt 2002; Kury, Obergfell-Fuchs & Ferdinand 2001; Van Damme & Pauwels 2010; Vandeviver 2010), it has also been repeatedly argued that future research should address the emotional dimension of fear of crime since this dimension has been less studied (Ferraro & LaGrange 1987; Hardyns & Pauwels 2010; Pleysier 2009). Consequently, in the current research I shall concern myself only with the emotional dimension of fear of crime and opt for a narrow interpretation of fear of crime.

It is noteworthy that the actual measurement of fear of crime confronts the researcher with several challenges. In addition to the usual (measurement) challenges associated with social survey research, the researcher is confronted with difficulties typical for the fear of crime research tradition (Jackson 2005). Most notorious for these specific difficulties is the repeated use of single item indicator measures derived from the National Crime Survey (Ditton & Farrall 2000; Farrall et al. 1997; Ferraro & LaGrange 1987; Hale 1996; Pleysier 2009). Such single item indicators ask respondents a variation on the so-called standard question: 'How safe do you feel or would you feel walking out alone in your neighborhood at night?'. However, this standard question is for a number of reasons seriously flawed and has been criticized by numerous authors (e.g. Ditton & Farrall 2000; Farrall et al. 1997; Ferraro & LaGrange 1987; Gray, Jackson & Farrall 2008; Pleysier 2009; Vanderveen 2006). It suffices to point out here that such a question cannot take the complexity of fear of crime fully into account (Hardyns & Pauwels 2010) and overestimates actual fear levels in the population (Farrall 2004; Farrall & Gadd 2004; Gray, Jackson & Farrall 2008). For various reasons (including comparability over time, parsimony and cost-effectivity) this operationalization is nevertheless still being used in current research (Farrall 2004; Vanderveen 2006).

Instead of recycling these defective operationalizations, it might however prove more fruitful to opt for an alternative question design that reckons with these critiques and

acknowledges the complexity of the central concept under scrutiny. Such an alternative question structure should include a filter question, allow to assess the frequency and intensity of experienced fear of crime and be limited to the past year only (Farrall 2004; Farrall & Gadd 2004; Farrall et al. 1997; Gray, Jackson & Farrall 2008). In short, this alternative question design should be able to deliver fairly accurate insights into the prevalence, frequency and intensity of fear of crime. In the current research I am indeed strongly motivated to explore the theoretical framework aimed at understanding the fear of crime by means of this alternative question structure proposed by Farrall and colleagues.

2.2 Explaining fear of crime

Numerous theoretical models focus on explaining the reported differences in fear of crime levels. These models are usually classified in accordance with the four broad theoretical perspectives distinguished by Hale (1996): vulnerability, victimization, the environment and (social-)psychological factors. The first two approaches stem from the early days of fear of crime research and try to explain differences in reported fear levels by focusing respectively on the perception of a heightened personal vulnerability and the experience of direct (i.e. self) and indirect (i.e. significant others) victimization. The third approach seeks to explain fear of crime by means of characteristics in one's social and/or physical everyday surroundings. The fourth and most recent approach combines the three previous approaches and explores the interplay between sociological and (social-)psychological factors and fear of crime (Van den Herreweghen 2010).

The present study draws upon the first three approaches and by doing so combines both criminal and personal factors in predicting fear of crime. In particular, I draw upon the vulnerability model, the (direct) victimization model and the incivilities model as part of the environmental approach. Moreover, by selecting these models first and second generation theoretical models are combined (Hale 1996; Van den Herreweghen 2010). In what follows I briefly touch upon the three selected models. A more thorough review of these theoretical perspectives can be found in Ditton & Farrall (2000), Hale (1996), Pleysier (2009) and Vanderveen (2006).

2.2.1 Vulnerability

The basic argumentation of the vulnerability model is that individuals who feel they lack the social and physical means to protect themselves from and/or cope with the negative outcome of criminal victimization will experience more fear of crime (Hale 1996; Jackson 2009; Killias, 1990). Throughout the literature, a physical and social component of vulnerability are

distinguished (Fraklin, Franklin & Fearn 2008; Killias 1990; Skogan & Maxfield 1981). Physical vulnerability refers to the assessment of one's own personal physical strength and competence in case of a physical assault and is often used to explain the heightened fear of crime levels of women and the elderly. Social vulnerability refers to the influence of one's social network and the personal financial situation and is linked to the reported higher fear levels of the socio-economic disadvantaged and ethnic minorities.

Vulnerability is usually measured through proxy measures[1]: gender and age serve as proxies for physical vulnerability, whereas socio-economic indicators and ethnicity are used as proxies for social vulnerability (cf. Franklin, Franklin & Fearn 2008; Jackson 2009; Kanan & Pruitt 2002; Killias & Clerici 2000; Maxfield 1984; McCrea, Shyy, Western & Stimson 2005; Pantazis 2000; Sacco & Glackman 1987; Skogan & Maxfield 1981).

2.2.2 Victimization
Although the general idea of this model is that prior victimization makes one more fearful of crime (Hale 1996; Pleysier 2009; Zedner 1997), some scholars (e.g. Winkel 1998; see also Vanderveen 1999) suggest that prior victimization might lead to less fear because of cognitive mediators and personal characteristics.

It should thus not be surprising that, notwithstanding a serious amount of research on the relationship between victimization and fear of crime, it is still unclear whether and to what extent the victimization-fear relationship holds (Ditton & Farrall 2000; Hale 1996; Pleysier 2009; Vanderveen 1999; Winkel 1998). Some researchers report strong effects (e.g. Kury, Obergfell-Fuchs & Ferdinand 2001), while others find the relationship to be weak or even completely absent (e.g. Covington & Taylor 1991; Taylor & Hale 1986).

One possible explanation for these mixed results might be a too general operationalization of victimization (Elchardus, De Groof & Smits 2003; Pleysier 2009; Vanderveen 1999). Some of the prior research measured victimization by means of a single victimization index. It might, however, prove more insightful to make a distinction between victimization of personal and property crime.

2.2.3 Incivilities
The central argument of the incivilities model is that the perception of incivilities in the neighborhood leads to an augmented fear of crime, because respondents associate these incivilities with (the threat of) crime (Kohm 2009; LaGrange, Ferraro & Supancic 1992; van der Wurff 1990).

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[1] For a commendable exception on this strategy see Killias & Clerici (2000) and Jackson (2009).

The concept incivilities refers to unusual situations and incidents in the neighborhood that residents associate with (limited) breaches on community values signaling a decline of social order and control in the neighborhood (Evans & Fletcher 2000; Hale 1996; LaGrange, Ferraro & Supancic 1992; Jackson 2004). When perceiving incivilities in their neighborhood, residents associate their surroundings with crime and danger and become conscious of their vulnerable position in that specific context. Although theoretically a physical and social component are discerned (Covington & Taylor 1991; Ferraro 1995; LaGrange, Ferraro & Supancic 1992), recent research suggests that this might not necessarily be the case (e.g. Ferguson & Mindel 2007; Franklin, Franklin & Fearn 2008; Ross & Jang 2000). Physical incivilities refer to 'disorderly surroundings' and 'untended property' (e.g. littering, run-down houses and graffiti), whereas social incivilities refer to 'disruptive behaviors' and 'untended people' (e.g. loitering youths, drug use and tramps).

The perception of incivilities is usually measured by asking respondents to indicate to what extent they assess a series of situations as problematical (Hale 1996; LaGrange, Ferraro & Supancic 1992; Pleysier 2009).

3 Methodology

3.1 Data

The current study primarily draws upon the European Crime and Safety Survey 2005 (ECSS) (EUICS 2007a)[2], which was embedded in the International Crime and Victims Survey and applied a similar methodology (EUICS 2007c). The ECSS is a sample survey conducted in 2005 among the inhabitants of the European Union by an ad hoc research consortium[3] led by Gallup Europe and funded by the European Commission. Topics covered include personal experiences with victimization, crime prevention, feelings of safety and law enforcement. Originally, the survey was administered to a sample of residents aged 16 or older of the 15 old member states of the European Union plus Estonia, Hungary and Poland. However, since no fear of crime data was present for Estonia and Poland, data for both countries was not included in the present study and consequently this study is limited to the data for the EU-15 and Hungary. The ECSS data was uniformly gathered in all participating countries, with the

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[2] More information can be found at http://www.europeansafetyobservatory.eu/.

[3] The European Union International Crime Survey Consortium is led by the Gallup Organisation Europe. Its members are the United Nations Interregional Crime and Justice Research Institute (UNICRI, Italy), the Max Planck Institute for Foreign and International Criminal Law (Germany), CEPS/INSTEAD (Luxembourg) and GeoX (Hungary).

exception of Poland and Estonia where a different approach was adopted[4]. The national samples were divided into a larger nationwide sample, stratified for the NUTS-2 regions (cf. Eurostat 2010) or comparable strata (e.g. Denmark), and a smaller subsample for the nations capitals[5]. Participants were selected using random digit dialing (RDD) of landlines, whereas in Finland an additional subsample was interviewed via mobile phones. The interviews were conducted by a combination of computer assisted telephone interviewing (CATI) and computer assisted telephone interviewing via the internet (WebCATI). Response rates varied from 36,9% in Luxembourg to 56,9% in Finland resulting in a total sample size of N = 31563[6]. The original study realizes representativity for the adult population of the 18 countries by reweighting the sample. However, since this study is limited to the EU-15 and Hungary and because weights are still considered experimental in MLwiN (CMM 2010), these weights were dropped. As a consequence, representativity for the EU-15 and Hungary cannot be fully guaranteed.

In addition to the ECSS data, this study uses country-specific data available in the Eurostat-database[7]. More specifically, the gross domestic product in market prices per capita (GDP per capita) (Eurostat 2011a) and the number of unemployed persons as a percentage of the labor force per country (unemployment rate) (Eurostat 2011b) were extracted from the Eurostat-database and included in the current study to be able to control for country-specific characteristics.

3.2 Variables

3.2.1 Dependent variables

As already mentioned under heading 2.1, an alternative question structure for measuring fear of crime is adopted in the present study. This question design refers to the past year only and entails a filter question that establishes whether someone feels fearful about becoming the victim of crime or not (prevalence), it also contains a question that gauges the number of times one feels fearful about crime (frequency)[8] and a question that gathers information on the amount of fear (intensity) experienced during the most recent fearful episode (cf. Farrall 2004; Farrall & Gadd 2004; Gray, Jackson & Farrall 2008). This alternative question design

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[4] Since the data for both countries is not used in the present study, the data collection scheme for both countries is not discussed. The interested reader is instead referred to EUICS (2007c).

[5] In Luxembourg, no additional interviews were conducted in the capital (EUICS 2007c).

[6] This is for the EU-15 & 1 context, i.e. the present study. When considering the EU-15 & 3 context, i.e. the original ECSS study, N = 41776.

[7] More information can be found at http://ec.europa.eu/eurostat

[8] It was decided to arbitrarily set the maximum number of times one could feel fearful about becoming the victim of crime to 365.

was present in the ECSS questionnaire. The exact wording of these fear of crime questions in the ECSS questionnaire can be found in appendix A (cf. Table 9) . All three variables serve in turn as the main outcome measures in their proper analysis.

3.2.2 Independent variables

3.2.2.1 Individual-level variables

Three common proxy-measures for *vulnerability* were included: age (in years), gender (male 0, female 1) and household combined annual income after tax deduction. To allow for a straightforward interpretation of the intercept (Hox 2010), age was centered around its grand median in the actual multilevel analysis. Household combined annual income is categorized as smaller than bottom 25% limit, larger than bottom 25% limit but smaller than median income, larger than median income but smaller than top 75% limit, larger than top 75% limit and missing (cf. heading 3.3). The category containing incomes lower than the bottom 25% limit is used as the reference category.

Victimization was measured using six yes/no-questions that tap into the victimization of certain types of crimes over the past five years. Questions that were used include: victimization of burglary, attempted burglary, robbery by force or threat, theft, sexual harassment and assaults or threats[9]. Because distinguishing between victimization of personal and property crimes might prove insightful (cf. heading 2.2.2), a categorical principal components analysis (CATPCA) was performed to verify whether such a structure is present in the data at hand. CATPCA indeed uncovered two distinct components that jointly explain 43,48% of the total variance[10]. The first component is related to victimization of personal crimes, the second component is related to victimization of property crimes. Both components were centered around their minimum (respectively two and four) and included in the multilevel analysis. A low score on a component indicates no victimization for that particular category of crimes, whereas a high score indicates a great deal of victimization.

A single four categories question that measures the extent to which one was in contact with drug related problems over the past 12 months in the area where one lives, was used as a proxy for the perception of *incivilities* in one's direct surroundings. The original variable was collapsed into a single binary variable that assesses whether one is confronted with drug

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[9] Although the ECSS contains more victimization questions than those used in the present study, these were disregarded because of their conditionality (e.g. victimization of car or motorcycle theft) and consequently high number of missing values. For the exact question wording see EUICS (2007b).

[10] More detailed results of the CATPCA are presented in appendix D.

problems or not. The categories *often*, *from time to time* and *rarely* were recoded into yes (1), the category *never* into no (0).

3.2.2.2 Country-level variables

Four country-level variables were included in the analysis to control for possible contextual effects on the prevalence, frequency and intensity of fear of crime.

The *proportion of victims* is the proportion of individuals per country that has been victimized at least once in the past five years and serves as a control variable for victimization risk (cf. Franklin, Franklin & Fearn 2008; Sampson & Groves 1989; Skogan & Maxfield 1981). The variable was computed by aggregating individual scores. A low score indicates that a limited amount of individuals were victims of crime in that country, signaling a potentially smaller victimization risk.

The *incivilities concentration* is the proportion of individuals per country that has been confronted with drug problems. This variable serves as a control variable for social order and control (cf. Sampson & Groves 1989). It was computed by aggregating individual scores. A low score implies a low concentration of incivilities at the national level, corresponding with higher social order and control.

GDP per capita (in €1000's) and the *unemployment rate* are included to control for national levels of criminal opportunity and social disorganization (cf. Franklin, Franklin & Fearn, 2008; Sampson & Groves 1989; Skogan & Maxfield 1981). Scores on both variables date from 2005 and were extracted from the Eurostat-database.

3.3 Item non-response

The item non-response for the variables used in the final analysis is touched upon here. Item non-response is a type of measurement error that occurs when a respondent fails to provide an answer on (a set of) questions and should be differentiated from unit non-response, a type of non-observational error (Pauwels & Svensson 2008; Stoop 2005). Item non-response has many causes (including an inadequate understanding of the question, a lack of motivation and/or perceiving certain questions as threatening) and it is problematic as it diminishes the available sample size and might lead to biased estimates. Item non-response can, in contrast with unit non-response, be studied more in detail, since the respondents have at least partially answered the questionnaire. When item non-response exceeds a 5% threshold for attentiveness (Little & Rubin 2002; Pauwels & Svensson 2008), it is considered problematic and consequently corrective measures should be implemented.

As can be seen in Table 1, the item non-response on most variables remains below this 5% threshold for attentiveness. Three variables, however, are well above this threshold: household combined annual income after tax deduction, fear of crime frequency and fear of crime intensity.

Variable	% item response (absolute numbers)	% item non-response (absolute numbers)
Age	99.4% (31365)	0.6% (198)
Gender	100.0% (31563)	0.0% (0)
Household combined annual income†	81.3% (25676)	18.7% (5887)
Victimization of property crimes	99.6% (31450)	0.4% (113)
Victimization of personal crimes	99.5% (31415)	0.5% (148)
Perception of drug related problems	97.2% (30675)	2.8% (888)
Proportion of victims‡	100.0% (16)	0.0% (0)
Incivilities concentration‡	100.0% (16)	0.0% (0)
GDP per capita (in €1000)‡	100.0% (16)	0.0% (0)
Unemployment rate‡	100.0% (16)	0.0% (0)
Fear of crime prevalence	100.0% (31563)	0.0% (0)
Fear of crime frequency	10.2% (3218)	89.8% (28345)
Fear of crime intensity	10.1% (3192)	89.9% (28371)

N = 31563
†: without the additional category containing the non-responding individuals.
‡: for the sake of completeness, the country-level variables have been included.

With regards to the missing values on the household income variable (and by extension for the missing values on all variables with the exception of the frequency and intensity variables), the initial idea was to use multiple imputation to solve the missing values issue (Little & Rubin 2002). However, because REALCOM-Impute[11] can only properly perform multiple imputation for two level data and MLwiN cannot fit and combine completed datasets when using MCMC estimation (Goldstein 2010), an alternative strategy was adopted. Given that only the household income variable shows a considerable amount of missing values, an additional category was added to this variable containing the non-responding individuals. This category was included in the multilevel analyses to verify whether the individuals that provided no response on the income question are significantly different from the responding individuals. No preemptive corrective measures were taken with regard to the other variables (at least, when fear of crime prevalence serves as the outcome variable).

Taking into account the design of the alternative fear of crime question structure, the high amount of item non-response for the frequency and intensity questions is not unexpected: both questions are follow-up questions to the fear of crime prevalence filter question. Respondents that provided a positive answer on the prevalence question have ideally provided

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[11] REALCOM-Impute is software specifically developed to perform multiple imputation for multilevel models. More information can be found at http://www.bristol.ac.uk/cmm/software/realcom/imputation.html.

a response on both follow-up questions as well. An additional analysis indeed revealed this to be the case for the vast majority of respondents, although it is also uncovered that a small number of respondents who positively answered the prevalence question did not provide an answer on the follow-up questions (cf. Table 2). Note, however, that only the individuals who responded positively on the prevalence filter question are of interest in the analyses with frequency and intensity as independent variables. It was therefore decided from the beginning to listwise delete all missing values on the frequency and intensity questions. But, given that MLwiN requires that the data in multinomial models does not contain any missing values and since REALCOM-Impute can only properly perform multiple imputation for two level data, it was additionally decided to listwise delete all missing values when the frequency and intensity of fear of crime are the independent variables. This approach effectively diminishes the sample size from N=31563 to N=3056 (when fear of crime frequency is the outcome) and N=3031 (when fear of crime intensity is the outcome).

Table 2 Contingency table for (response on) fear of crime frequency and (response on) fear of crime intensity by fear of crime prevalence

| | | Fear of crime prevalence | |
		No	Yes
Fear of crime frequency	Response	0.0% (0)	98.5% (3218)
	Non-response	100.0% (28297)	1.5% (48)
Fear of crime intensity	Response	0.0% (0)	97.7% (3192)
	Non-response	100.0% (28297)	2.3% (74)

N = 31563

3.4 Analysis

Multilevel modeling seems essential to adequately answer the central research question, because a three-level hierarchical structure[12] is present in the ECSS-data (Hox 2010; Snijders & Bosker 1999). Multilevel modeling takes this hierarchical structure into account and corrects for the ensuing dependency of individuals living within the same region and country, resulting in more accurately estimated standard errors. The highest level in the ECSS-data is composed of the 16 selected EU-countries. The intermediate level is formed by the NUTS-2 regions and comparable strata[13] supplemented with the capital of the EU-countries. The lowest level consists of the individual respondents. For all three outcome variables it is

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[12] For an overview of this structure see Table 18 in appendix D.
[13] The Danish nationwide sample was not stratified for the NUTS-2 regions. Instead, three generic regions somewhat comparable to the NUTS-2 regions (in particular (1) Nordjylland, Midtjylland & Syddanmark, (2) Sjaelland and (3) Hovedstaden) and Kopenhagen form the intermediate level. Because in Finland an additional subsample was interviewed via mobile phone, it was not possible to establish the NUTS-2 region for these respondents. It was therefore, in the current study, decided to add an additional group of mobile phone users to the intermediate level in the Finnish subsample. Thus the intermediate level in Finland comprises the five Finnish NUTS-2 regions, Helsinki and a group of mobile phone users.

verified whether it is indeed necessary to correct for this hierarchical structure in the data by (1) contrasting the computed magnitude of the level two and three variances in relation to their standard errors against a suggested cut-off value of approximately two (Twisk 2006) and by (2) estimating a single level intercept-only model and a three level intercept-only model and then comparing the corresponding values of the deviance information criterion (DIC)[14] (Jones & Subramanian 2010; Spiegelhalter et al. 2002). Results of both strategies are mixed: the Wald-test on the variance parameters suggests that the level two and three variances for the prevalence of fear of crime model and the level two variance for the frequency of fear of crime model can be considered 'important' and should be included in the model, whereas the same test suggest that the level two and three variances for the fear of crime intensity model and the level three variance for the fear of crime frequency model are 'unimportant' and can be omitted (Twisk 2006) (cf. Table 3). A comparison of the DIC-values, however, clearly indicates that the models that correct for the three level hierarchical structure are superior (cf. Table 4). Notwithstanding these mixed results, it was decided to adopt the outcome of the model selection approach and thus use multilevel modeling to effectively answer the central research question.

First, a multilevel binary logistic regression analysis is used to assess the relationship between each of the three sets of independent variables and the prevalence of fear of crime, as the dependent variable of interest, fear of crime prevalence, is a single dichotomous outcome with responses no (0) and yes (1) (Hox 2010; Twisk 2006).

Second, since the frequency of experienced fear of crime is a count of events, a multilevel negative binomial[15] regression analysis is used to explore the relationship between the independent variables and the frequency of fear of crime (Hox 2010; Twisk 2006).

Third and final, the relationship between the independent variables and the intensity of experienced fear of crime is explored using a multilevel ordered multinomial logistic regression analysis, because the intensity of fear of crime is an ordered categorical outcome variable with responses not very fearful (1), a little bit fearful (2), quite fearful (3) and very fearful (4) (Hox 2010; Rashbash et al. 2009b; Twisk 2006). The category 'not very fearful' is used as the reference category of the outcome variable.

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[14] Although strictly speaking not wholly correct, it was decided to initially fit a single level and three level intercept-only Poisson regression model to obtain a DIC-value for the fear of crime frequency model, because MCMC estimation cannot be used to fit a negative binomial regression analysis (Jones & Subramanian 2010). Consequently, the under this heading presented values for the DIC and variances for the frequency model were all obtained from a Poisson regression model rather than a negative binomial regression model.

[15] The initial idea was to fit a Poisson regression model. When, however, estimating alternative negative binomial models the over-dispersion parameters turned out to be significant (cf. Table 20 in appendix F) indicating that the negative binomial models are more appropriate.

Table 3 Estimated level two and level three variances for all three outcome variables in a three level random intercept- only model

	σ_{level2} (s.e.)	σ_{level3} (s.e.)
Prevalence of fear of crime	0.082 (0.021)	0.257 (0.117)
Frequency of fear of crime	1.332 (0.152)	0.489 (0.270)
Intensity of fear of crime	0.020 (0.019)	0.089 (0.049)

Table 4 DIC-values for all three outcome variables in a single level random intercept-only model and three level random intercept-only model

	Single level model	Three level model
Prevalence of fear of crime	21001.088	20306.423
Frequency of fear of crime	287810.753	241623.547
Intensity of fear of crime	7807.248	7752.319

Concerning the analytic strategy, the following was adopted. Initially, some relevant descriptive statistics of the dependent variables are presented and discussed[16]. These are obtained using SPSS/PASW 18. Next, for each of the three outcome variables six random intercept models are specified. Firstly, an intercept-only model is specified to assess the baseline variation in the dependent variable and to establish a benchmark value for the DIC[17]. Secondly, each of the three theoretical models are independently specified. Thirdly, all individual-level models are combined. Fourthly, the country-level variables are added to the combined individual-level model. This strategy allows for an evaluation of each theoretical model separately as well as a DIC-value comparison of the combined individual-level model with the full model (Jones & Subramanian 2010) – at least for those models estimated with MCMC estimation. All models are estimated in MLwiN 2.22 (Rasbash et al. 2009a). The logistic and ordered multinomial models are estimated using Markov Chain Monte Carlo (MCMC) estimation[18] (Browne 2009), whereas the negative binomial models are estimated using second order penalized quasi-likelihood methods because MCMC estimation is not available in MLwiN for these type of models (Jones & Subramanian 2010).

4 Results

The results are presented as follows. First, relevant descriptive statistics for the prevalence, frequency and intensity of fear of crime are presented and discussed. Second, the results of the binary logistic regression analysis with fear of crime prevalence as the outcome are discussed. Third, the results of the negative binomial regression analysis with fear of crime frequency as the dependent variable are interpreted. Fourth and final, the results of the ordered multinomial

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[16] Relevant descriptive statistics for the independent variables can be found in appendix B.
[17] At least when MCMC estimation was possible.
[18] MCMC estimation is considered the preferred method of estimation when the dependent variable is categorical and when there are only a limited number of higher level units (Hox 2010; Jones & Subramanian 2010), which is indeed the case in the present study.

regression analysis with fear of crime intensity as the dependent variable are presented and interpreted.

4.1 Descriptive statistics

Table 5 shows descriptive statistics for the alternative fear of crime question structure. Approximately a tenth of the respondents were fearful of becoming a victim of crime in the past 12 months. Those respondents that indicated they felt fearful about crime where then asked how frequent they felt like this in the past 12 months. On average, respondents felt fearful of becoming a victim of crime 30 times in the past year. When looking into the raw data (cf. Figure 1 and Table 13 in appendix C) it becomes apparent that about half of the fearful respondents felt like this between one and three times in the past 12 months. Also noteworthy, is that approximately 5% of the fearful respondents felt fearful (over) 100 times in the past 12 months – roughly speaking, at least every three days. Furthermore, those that reported feeling fearful of becoming a crime victim were asked how intensely they experienced their most recent fearful episode. Table 5 indicates that a marked majority of the fearful respondents describe their last fearful experience as either 'a little bit' (38.40%) or 'quite' (33.00%) fearful. The same table also suggests that only a small portion (15.70%) of the fearful respondents were 'very' fearful during their latest fearful episode.

Table 5 Descriptive statistics for the prevalence, frequency and intensity of fear of crime

	%	Mean	S.D.	Min.	Max.
Fear of crime prevalence					
No (0)	89.70%	--	--	--	--
Yes (1)	10.30%	--	--	--	--
Fear of crime frequency[†]	--	29.55	76.94	1.00	365.00
Fear of crime intensity[†]					
Not very fearful (1)	12.80%	--	--	--	--
A little bit fearful (2)	38.40%	--	--	--	--
Quite fearful (3)	33.00%	--	--	--	--
Very fearful (4)	15.70%	--	--	--	--

[†]: computed only for those respondents that experienced fear of crime in the past 12 months.

Fear of crime frequency
Raw data (in percentage)
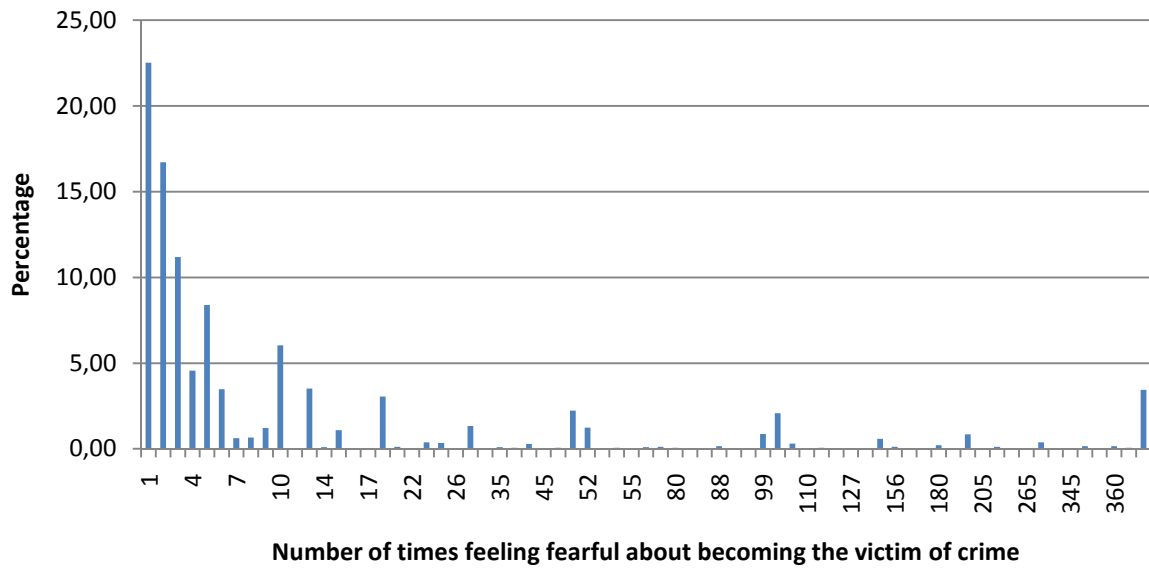
Figure 1 Number of times that respondents feel fearful about becoming the victim of crime (raw data) in percentages

4.2 Prevalence of fear of crime

Table 6 summarizes the results from the separate analysis of the intercept-only model and the vulnerability, victimization and incivilities model of fear of crime. It was decided to present the odds-ratios instead of the regression coefficients[19], enabling a more tangible interpretation of the results (Agresti 2007). Results from the intercept-only model (model 1) show there is significant variance both between countries and within countries between regions. The intra-class correlation (ICC) approximates 0.093[20], signaling that 9.3% of the observed individual differences in fear of crime are situated at the regional- and national-level.

Results from model 2 suggest that age, gender and household combined annual income all have significant effects on the fear of becoming a victim of crime. Both the elderly and the economic advantaged are less likely to experience fear of crime, whereas females are more likely to experience fear of crime. The effect of age is in contrast with the vulnerability model. Finally, although the overall effect of household income is significant, this effect is not unambiguous since the decrease in odds of experiencing fear of crime is more pronounced for the smaller income category than for the larger income categories. Interesting as well is that the respondents that choose not to answer on the income question are less likely to be fearful of becoming a victim of crime.

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[19] These can be found in appendix E (cf. Table 19).

[20] This value indicates the resemblance of individuals within the same region and country and can be calculated as follows (Hox 2010): $\rho = \frac{\sigma_{v0}^2 + \sigma_{u0}^2}{\sigma_{v0}^2 + \sigma_{u0}^2 + \sigma_{e0}^2} = \frac{0.257 + 0.082}{0.257 + 0.082 + 3.29} = 0.093$.

The victimization model (model 3) clearly shows that both victimization of property and personal crimes are significantly associated with increased fear of crime. In line with the victimization model, it is found that victims of property crimes are more likely to experience fear of crime. Similarly, victims of personal crimes are also more likely to be fearful of becoming a crime victim. Additionally, the DIC-value suggests that the victimization model is the superior individual-level model for predicting fear of crime (Jones & Subramanian 2010; Spiegelhalter et al. 2002).

Finally, results from model 4 are consistent with the incivilities model. Respondents perceiving drug related problems in their direct surroundings are more likely to experience fear of crime than respondents who do not perceive such incivilities.

Table 6 also displays the results from the analysis of the combined individual-level models (model 5) and the full model containing both individual- and country-level variables (model 6). Combining the three individual-level models (model 5) results in an even lower DIC-value, as compared to the victimization model (model 3), suggesting that this model is more superior for predicting fear of crime. Inspection of the effects of the individual-level variables, shows that the effects of all individual-level variables remain significant. Combining the individual level variables seems to mitigate the effect of household income. Although the overall effect remains significant, only the categories containing the lower incomes and those that provided no answer exhibit a significant inhibiting effect on the odds of experiencing fear of crime. Additionally, the net-effects of the perception of incivilities and victimization of property crimes are reduced. The Wald-statistic ($\chi^2 = 757.506$) nonetheless suggests that victimization of property crimes is the most important predicting variable in model 5.

Model 6 added the country-level variables. Results indicate that none of the effects of the individual-level variables are dramatically altered and that no country-level variable exhibits a significant effect. Although the results suggest that the national unemployment rate exhibits a significant effect, this effect is not significant at a more common significance level ($\alpha < 0.050$). Even though this model can be taken into consideration when comparing the DIC-values of this model and model 5, it is concluded that the inclusion of the four selected country-level variables is not sensible when predicting fear of crime prevalence, because the added variables only result in a very marginal drop of the DIC.

Table 6 Results (in odds-ratios) from individual-level models, combined individual-level models and combined individual-level models & country-level variables predicting fear of crime prevalence (0 = no, 1 = yes)

	Model 1 (intercept-only) OR	Model 2 (vulnerability) OR	Model 3 (victimization) OR	Model 4 (incivilities) OR	Model 5 (combined individual) OR	Model 6 (individual & country) OR
Constant	0.094***	0.087***	0.061***	0.070***	0.048***	0.048***
Vulnerability variables						
Age[a]	--	0.978***	--	--	0.985***	0.985***
Gender[b] – female	--	1.411***	--	--	1.383***	1.380***
Household combined annual income[c]		***			***	***
> bottom 25% but < median income (2)	--	0.791***	--	--	0.829**	0.829**
> median income but < top 75% (3)	--	0.840**	--	--	0.925	0.922
> top 75% (4)	--	0.866*	--	--	0.904	0.901
Missing (5)	--	0.634***	--	--	0.723***	0.723***
Victimization variables						
Victimization of property crimes[d]	--	--	1.562***	--	1.564***	1.562***
Victimization of personal crimes[e]	--	--	2.203***	--	1.986***	1.986***
Incivilities variable						
Perception of drug related problems[f] – yes	--	--	--	2.111***	1.613***	1.614***
Country-level variables						
Proportion victims[g]	--	--	--	--	--	1.005
Incivilities concentration[h]	--	--	--	--	--	0.990
GDP per capita (in €1000)[i]	--	--	--	--	--	0.991
Unemployment rate[j]	--	--	--	--	--	0.869(*)
$\sigma^2_{country}$ (s.e.)	0.257 (0.117)	0.276 (0.127)	0.256 (0.115)	0.290 (0.128)	0.289 (0.129)	0.280 (0.157)
σ^2_{region} (s.e.)	0.082 (0.021)	0.075 (0.020)	0.041 (0.016)	0.060 (0.030)	0.030 (0.014)	0.032 (0.015)
DIC	20306.423	19734.464	18800.901	19278.448	17717.568	17717.135
$N_{level-3}$	16	16	16	16	16	16
$N_{level-2}$	231	231	231	230	230	230
$N_{level-1}$	31563	31365	31308	30675	30271	30271

[a]: centered around grand median (48). [b]: ref.cat. is male (0). [c]: ref.cat. is < bottom 25% (1). [d]: centered around minimum (2). [e]: centered around minimum (4). [f]: ref.cat. is no (0). [g]: centered around the grand mean (34.95). [h]: centered around the grand mean (36.27). [i]: centered around the grand mean (29.17). [j]: centered around the grand mean (7.21). [k]: the ICC for the region level is printed.
(*) $p < 0.100$. * $p < 0.050$. ** $p < 0.010$. *** $p < 0.001$.

4.3 Frequency of fear of crime

Results from the separate analyses of the vulnerability, victimization and incivilities model are summarized in Table 7. Note, that the estimated regression coefficients are presented.

Because quasi-likelihood estimation methods, instead of MCMC estimation, were used to estimate the negative binomial models, no baseline DIC-value was obtained. Nor can the ICC be straightforwardly computed (Hox 2010). Therefore, the intercept-only model (model 1) is not discussed, even though it is displayed in Table 7.

Results from the vulnerability model (model 2) indicate that only age is significantly associated with the frequency with which one feels fearful about becoming the victim of crime. On the other hand, gender and household combined annual income are not. More in particular, the effect of age suggest that the elderly are more likely to frequently feel fearful of crime.

Results from model 3, the victimization model, clearly show that both victimization of property and personal crimes are significantly associated with the frequency of fear of crime. Both variables exhibit a similar positive effect, though the effect of victimization of property crimes is somewhat more pronounced. The effects suggest that as individuals are confronted with a greater deal of victimization of either property or personal crimes the risk of experiencing fearful episodes increases.

Even though the results of model 4 suggest that it could be argued that individuals who perceive drug related problems in their surroundings more frequently feel fearful about becoming a crime victim, this effect is not significant at a more common significance level of $\alpha < 0.050$ and it is therefore concluded that perceiving incivilities has no significant impact on the frequency of fear of crime.

Table 7 additionally displays the results from the combined individual-level variables model and the combined individual- and country-level variables model. Including all individual-level variables in a single model (model 5) slightly alters the effects of the individual-level variables, although this does not result in different substantive conclusions. The Wald-statistic suggests that gender ($\chi^2 = 44.060$) is the most important predictor of the frequency with which one feels fearful about becoming the victim of crime.

Finally, all individual-level variables were combined with the selected country-level variables (model 6). Again, none of the effects of the individual-level variables are dramatically altered: all previously significant variables remain significant and the substantive

interpretations are unaltered. The results additionally indicate that the proportion of criminal victims is significantly positively associated with the frequency of fear of crime. In other words, as the national victimization risk increases the likelihood of experiencing fear of crime episodes increases as well.

Table 7 Results (in estimated coefficients) from individual-level models, combined individual-level models and combined individual-level models & country-level variables predicting fear of crime frequency

	Model 1 (intercept-only)	Model 2 (vulnerability)	Model 3 (victimization)	Model 4 (incivilities)	Model 5 (combined individual)	Model 6 (individual & country)
Constant	3.138***	3.060***	2.806***	2.960***	2.695***	2.633***
Vulnerability variables						
Age[a]	--	0.018***	--	--	0.020***	0.020***
Gender[b] – female	--	-0.071	--	--	-0.083	-0.076
Household combined annual income[c]						
> bottom 25% but < median income (2)	--	-0.052	--	--	-0.054	-0.038
> median income but < top 75% (3)	--	-0.116	--	--	-0.031	-0.023
> top 75% (4)	--	-0.035	--	--	-0.038	-0.028
Missing (5)	--	-0.038	--	--	0.023	0.040
Victimization variables						
Victimization of property crimes[d]	--	--	0.343***	--	0.327***	0.335***
Victimization of personal crimes[e]	--	--	0.156**	--	0.195***	0.196***
Incivilities variable						
Perception of drug related problems[f] – yes	--	--	--	0.195(*)	0.118	0.124
Country-level variables						
Proportion victims[g]	--	--	--	--	--	0.078*
Incivilities concentration[h]	--	--	--	--	--	-0.021
GDP per capita (in €1000)[i]	--	--	--	--	--	-0.019
Unemployment rate[j]	--	--	--	--	--	-0.053
$\sigma^2_{country}$ (s.e.)	0.292 (0.172)	0.415 (0.164)	0.437 (0.171)	0.453 (0.177)	0.433 (0.169)	0.347 (0.143)
σ^2_{region} (s.e.)	1.906 (0.201)	0.008 (0.035)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$N_{level-3}$	16	16	16	16	16	16
$N_{level-2}$	197	197	197	197	197	197
$N_{level-1}$	3056	3056	3056	3056	3056	3056

[a]: centered around grand median (41). [b]: ref.cat. is male (0). [c]: ref.cat. is < bottom 25% (1). [d]: centered around minimum (2). [e]: centered around minimum (4). [f]: ref.cat. is no (0). [g]: centered around the grand mean (34.95). [h]: centered around the grand mean (36.27). [i]: centered around the grand mean (29.17). [j]: centered around the grand mean (7.21).
(*) $p < 0.100$. * $p < 0.050$. ** $p < 0.010$. *** $p < 0.001$.

4.4 Intensity of fear of crime

Finally, Table 8 compares the impact of the vulnerability, victimization and incivilities variables on the intensity of recently experienced fear of crime. It was again decided to present the odds-ratios rather than the estimated coefficients (cf. supra). All models have been specified with common coefficients[21].

The ICC, calculated using the intercept-only model (model 1), indicates that about 3.2%[22] of the observed individual differences in the intensity of experienced fear of crime can be situated at the regional- and national-level. In other words, most of the observed differences in the intensity of recently experienced fear are situated at the individual-level.

The vulnerability model (model 2) shows that gender and household combined annual income are significantly associated with fear of crime intensity. Age does not contribute significantly to the prediction of the intensity of experienced fear of crime. More specifically, the effect of gender signals that it is less likely for women than for men to more intensely experience their last fearful episode. The overall effect of household income is significant and the effects of the individual categories are comparable: the economic advantaged are less likely to feel more intensely fearful than the economic disadvantaged. Moreover, the results indicate that the respondents who did not provide an answer on the income question are less likely to feel more intensely fearful than the economic disadvantaged. In addition, the DIC-value suggests that the vulnerability model is the superior individual-level model for predicting the intensity of recently experienced fear of crime.

Results from the victimization model (model 3) indicate that both victimization of property and personal crimes have a significant effect on the intensity of fear of crime. The effect of both variables is similar. As individuals are confronted with a greater deal of victimization of either property or personal crimes, the likelihood of more intensely experiencing fear of crime increases.

Results from the incivilities model (model 4) indicate that perceiving drug related problems in one's surroundings has a significant effect on how intensely one experiences fear of crime: individuals perceiving such problems in their surroundings are more likely to experience the most recent fearful event as more intense.

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[21] A comparison of the common coefficient models with their separate coefficient counterparts (cf. Table 22 in appendix G) suggested that, although there are some differences between the separate coefficients, the less complicated models with common coefficients seemed plausible (cf. Rasbash et al. 2009b).

[22] The ICC can again be calculated as follows: $\rho = \frac{\sigma_{v0}^2 + \sigma_{u0}^2}{\sigma_{v0}^2 + \sigma_{u0}^2 + \sigma_{e0}^2} = \frac{0.090 + 0.020}{0.090 + 0.020 + 3.29} = 0.032.$

In addition to the individual-level models, the combined individual-level models and the full model with country-level variables are also displayed in Table 8. When combining all individual-level variables (model 5), the DIC-value drops markedly as compared to the vulnerability model, the superior individual-level model when predicting fear of crime intensity, indicating that the combined individual-level variables model is the preferred model for predicting the intensity of recently experienced fear of crime. The effects of all individual-level variables remain significant, although the effect of the incivilities variable is no longer significant at a more usual significance level ($\alpha < 0.050$), and virtually unchanged. Based on the Wald-statistic, gender ($\chi^2 = 87.089$) seems the most important predictor of fear of crime intensity.

After including the country-level variables (model 6), it becomes evident that the effects of the individual-level variables remain unaltered, with the exception that perceiving drug problems is no longer a significant predictor, and that none of the country-level variables are significantly associated with the intensity of fear of crime. This leads, in combination with a slightly higher DIC-value as compared to model 5, to the conclusion that including these selected country-level variables does not really make sense when predicting the intensity of recently experienced fear of crime.

Table 8 Results (in odds-ratios) from individual-level models, combined individual-level models and combined individual-level models & country-level variables predicting fear of crime intensity (1 = not very fearful, 2 = a little bit fearful, 3 = quite fearful, 4 = very fearful; ref.cat. is 'not very fearful')

	Model 1 (intercept-only) OR	Model 2 (vulnerability) OR	Model 3 (victimization) OR	Model 4 (incivilities) OR	Model 5 (combined individual) OR	Model 6 (individual & country) OR
Constant/threshold	7.050***	13.902***	5.675*	6.580***	10.227***	10.412***
Threshold 2	0.952	1.782***	0.751***	0.888	1.279(*)	1.298*
Threshold 3	0.178***	0.321***	0.138***	0.168***	0.224***	0.227***
Vulnerability variables						
Age[a]	--	1.000	--	--	1.003	1.003
Gender[b] – female	--	0.513***	--	--	0.505***	0.506***
Household combined annual income[c]		***			***	***
> bottom 25% but < median income (2)	--	0.697**	--	--	0.702**	0.698**
> median income but < top 75% (3)	--	0.699**	--	--	0.731**	0.725**
> top 75% (4)	--	0.531***	--	--	0.542***	0.542***
Missing (5)	--	0.620***	--	--	0.655**	0.644***
Victimization variables						
Victimization of property crimes[d]	--	--	1.223***	--	1.224**	1.221**
Victimization of personal crimes[e]	--	--	1.283***	--	1.287***	1.285***
Incivilities variable						
Perception of drug related problems[f] – yes	--	--	--	1.151*	1.133(*)	1.116
Country-level variables						
Proportion victims[g]	--	--	--	--	--	1.020
Incivilities concentration[h]	--	--	--	--	--	1.009
GDP per capita (in €1000)[i]	--	--	--	--	--	0.998
Unemployment rate[j]	--	--	--	--	--	1.043
$\sigma^2_{country}$ (s.e.)	0.090 (0.048)	0.097 (0.052)	0.081 (0.047)	0.083 (0.047)	0.082 (0.048)	0.074 (0.053)
σ^2_{region} (s.e.)	0.020 (0.021)	0.014 (0.017)	0.021 (0.021)	0.019 (0.022)	0.014 (0.016)	0.014 (0.016)
DIC	7752.812	7636.331	7698.060	7751.373	7577.792	7578.572
$N_{level-3}$	16	16	16	16	16	16
$N_{level-2}$	199	199	199	199	199	199
$N_{level-1}$	3031	3031	3031	3031	3031	3031

[a]: centered around grand median (41). [b]: ref.cat. is male (0). [c]: ref.cat. is < bottom 25% (1). [d]: centered around minimum (2). [e]: centered around minimum (4). [f]: ref.cat. is no (0). [g]: centered around the grand mean (34.95). [h]: centered around the grand mean (36.27). [i]: centered around the grand mean (29.17). [j]: centered around the grand mean (7.21). [k]: the ICC for the region level is printed.
(*) $p < 0.100$. * $p < 0.050$. ** $p < 0.010$. *** $p < 0.001$.

5 Discussion and conclusion

The current study examined the efficacy of the vulnerability, victimization and incivilities model of fear of crime on an alternative fear of crime question design in a cross-national European context. Data from the European Crime and Safety Survey 2005 were used to realize this goal.

Initially, when looking into basic fear of crime variation, it was suggested that fear of crime is not widespread in the population of the EU-15 and Hungary. Moreover, it seems that the vast majority of those who experience fear of crime feel fearful on irregular occasions. When gauging the intensity of the latest fearful event it became clear that only a limited number of respondents describes this episode as being very fearful. Although it is indeed questionable to what extent the most recent fearful episode is representative for all fearful events (Farrall & Gadd 2004), the combined findings nonetheless confirm and expand the conclusions of Farral & Gadd (2004) and Gray, Jackson & Farrall (2008) concerning fear of crime in the British population.

The main goal of this study was to revisit the vulnerability, victimization and incivilities model in light of a new fear of crime question design. In particular, the present study considered the impact of individual- and country-level characteristics on the prevalence, frequency and intensity of fear of crime.

With regard to the prevalence of fear of crime, all variables of the individual-level models were found to be related with fear of crime prevalence more or less as anticipated. Although an inverse effect of age was found, suggesting that the elderly are in fact less likely to experience fear of crime than the young, this was not completely surprising, since age and fear were already found to be inversely related in previous research (Chadee & Ditton 2003; Kanan & Pruitt 2002). Moreover, the tests indicated that prior victimization of property and personal crimes are important predictors of fear of crime prevalence, delivering new arguments in the ongoing debate on the victimization-fear nexus (cf. Pleysier 2009)**.** Finally, the analysis suggested that none of the included country-level variables contribute significantly to the prediction of experiencing fear of crime.

Variables of the selected individual-level models had mixed effects on the frequency of fear of crime. Only age and victimization of property and personal crimes were found to be significantly associated with the frequency with which one feels fearful. The effects of all three variables were in line with the central arguments of their respective theoretical models. Even though the logic of the vulnerability and incivilities model would seem to dictate that

respectively women, the economic disadvantaged and those perceiving incivilities in their surroundings are more often confronted with fearful events, no significant effects of gender, household income and the perception of drug related problems were found. Interestingly was the uncovering of a significant structural effect of victimization risk. The effect suggested that as the risk of victimization increases, the number of times one feels fearful tends to increase as well.

Concerning the intensity of experienced fear of crime, most variables of the individual-level models were found to be significantly associated with the intensity of fear of crime. Only age did not exhibit a significant effect on the intensity of fear. The conflicting significant effect of gender, indicating that women are less likely to intensely experience fear of crime than men, is interesting – especially in view of the previous research (e.g. Sutton & Farrall 2005; 2009) that suggested that men are more likely to downplay their experienced fear of crime (see also Hardyns & Pauwels 2010). Finally, the results indicated that none of the country-level variables had a significant impact on the intensity of experienced fear.

The reader should be aware that the current study has some limitations. Firstly, one of the most important drawbacks is the limited operationalization of both vulnerability and the perception of incivilities. Although it is common practice to measure vulnerability by means of proxy-measures (Hale 1996; Killias & Clerici 2000), such a practice might introduce validity and reliability problems. Moreover, Killias & Clerici (2000) and Jackson (2009) have previously demonstrated that a more encompassing operationalization results in a profounder understanding of the relationship between vulnerability and fear of crime. Likewise, the use of a single drug problem question as a proxy for the perception of incivilities is not completely appropriate and might introduce validity and reliability issues. Secondly, the findings with regard to the frequency and intensity question should be approached with considerable care. Although the logic of the considered theoretical models can be extended with regard to the number of times and the amount one feels fearful, it is not explicitly present in the central arguments of these classical theoretical models. The current empirical tests with fear of crime frequency and intensity as outcome variables should therefore be considered of an exploratory nature. Ideally, the current findings are validated by future research (in other settings). Finally, the reader should remain conscious of the fact that the results of the current study are not fully representative for the residents of the EU-15 and Hungary since the weights that allowed for such claims were dropped in the multilevel analyses.

Notwithstanding these limitations, the present study demonstrated the existence of a relationship between the vulnerability, victimization and incivilities model of fear of crime

and fear of crime prevalence. This study additionally showed that the basic argumentations of the victimization and incivilities models can largely be extended with regard to the frequency and intensity of fear of crime. The arguments of the vulnerability model, however, cannot be straightforwardly extended to the frequency and intensity of experienced fear of crime. Most importantly is that the results of this study suggest that prior victimization matters in the genesis of fear of crime. Victimization of property and personal crimes turned out to be consistent predictors of the prevalence, frequency and intensity of fear of crime. Future research should therefore, in light of the ongoing debate on the relevancy of previously experienced victimization with regard to fear of crime, commit to continue exploring this relationship.

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Appendices

Appendix A: question wordings

Table 9 Question wordings (source: EUICS 2007b)

	Question wording	Possible answers
Gender	Q16 – *Interviewer notes down sex of respondent without asking*	1) male 2) female
Household combined annual income	Q352. – Could you please tell me whether your household's combined monthly income after deductions for tax etc, is below or above [median income - xxx]?	1) below xxx 2) above xxx 9) don't know/refuses to say (spontaneous)
	Q353. – Is it higher or lower than [bottom 25% limit - yyy] a month?	1) higher than yyy 2) lower than yyy 9) don't know/refuses to say (spontaneous)
	Q354. – Is it higher or lower than [upper 25% limit - zzz] a month?	1) higher than zzz 2) lower than zzz 9) don't know/refuses to say (spontaneous)
Victimization	Q60. – Over the past five years, did anyone actually get into your home without permission, and steal or try to steal something? I am not including here thefts from garages, sheds or lock-ups.	1) yes 2) no 9) don't know (spontaneous)
	Q65. – Apart from this, over the past five years, do you have any evidence that someone tried to get into your home unsuccessfully. For example, damage to locks, doors or windows or scratches around the lock?	1) yes 2) no 9) don't know (spontaneous)
	Q70. – Over the past five years has anyone stolen something from you by using force or threatening you, or did anybody try to steal something from you by using force or threatening force.	1) yes 2) no 9) don't know (spontaneous)
	Q75. – Apart from theft involving force there are many other types of theft of personal property, such as pickpocketing or theft of a purse, wallet, clothing, jewellery, sports equipment. This can happen at one's work, at school, in a pub, on public transport, on the beach, or in the street. Over the past five years have you personally been the victim of any of these thefts?	1) yes 2) no 9) don't know (spontaneous)
	Q80. – First, a rather personal question. People sometimes grab, touch or assault others for sexual reasons in a really offensive way. This can happen either at home, or elsewhere, for instance in a pub, on the street, at school, on public transport, in cinemas, on the beach, or at one's workplace. Over the past five years has anyone done this to you? Please take your time to think about it.	1) yes 2) no 9) don't know (spontaneous)
	Q85. – Apart from the incidents just covered, have you over the past five years been personally attacked or threatened by someone in a way that really frightened you, either at home or elsewhere, such as in a pub, in the street, at school, on public transport, on the beach, or at your workplace?	1) yes 2) no 9) don't know (spontaneous)
Drug problems	Q304 – Over the last 12 months, how often were you personally in contact with drug related problems in the area where you live? For example seeing people dealing in drugs, taking or using drugs in public spaces, or finding syringes left by drug addicts? Was this often, from time to time, rarely or never?	1) Often 2) From time to time 3) Rarely 4) Never 5) Don't know (spontaneous)

Prevalence of fear of crime	F2. – (Apart from the cases when you actually fell victim of a crime) in the past 12 months, was there a particular occasion when you felt fearful about becoming a victim of crime?	1) yes 2) no
Frequency of fear of crime	F3 – (If 'yes' on F2) How frequently have you felt like this in the past year?	Write in number of times ___
Intensity of fear of crime	F4 – (If 'yes' on F2) And on the last occasion, how fearful did you feel?	1) not very fearful 2) a little bit fearful 3) quite fearful 4) very fearful 9) cannot remember (spontaneous)

Appendix B: descriptive statistics

Table 10 Descriptive statistics for the individual-level variables when fear of crime prevalence is the outcome

Individual-level variables	%	Mean	S.D.	Min.	Max.
Age	--	47.83	17.67	16.00	103.00
Gender					
Male (0)	38.70%	--	--	--	--
Female (1)	61.30%	--	--	--	--
Household combined annual income					
< bottom 25% (1)	14.50%	--	--	--	--
> bottom 25% but < median income (2)	20.50%	--	--	--	--
> median income but < top 75% (3)	20.30%	--	--	--	--
> top 75%	26.10%	--	--	--	--
Missing (5)	18.70%	--	--	--	--
Victimization of property crimes	--	2.15	0.41	2.00	4.00
Victimization of personal crimes	--	4.35	0.62	4.00	8.00
Perception of drug related problems (incivilities)					
No (0)	64.40%	--	--	--	--
Yes (1)	35.60%	--	--	--	--

Table 11 Descriptive statistics for the individual-level variables when fear of crime frequency or intensity are the outcome

Individual-level variables	%	Mean	S.D.	Min.	Max.
Age	--	42.36	16.82	16.00	101.00
Gender					
Male (0)	66.60%	--	--	--	--
Female (1)	33.40%	--	--	--	--
Household combined annual income					
< bottom 25% (1)	15.20%	--	--	--	--
> bottom 25% but < median income (2)	19.20%	--	--	--	--
> median income but < top 75% (3)	21.20%	--	--	--	--
> top 75%	30.00%	--	--	--	--
Missing (5)	14.50%	--	--	--	--
Victimization of property crimes	--	2.28	0.55	2.00	4.00
Victimization of personal crimes	--	4.79	0.92	4.00	8.00
Perception of drug related problems (incivilities)					
No (0)	49.60%	--	--	--	--
Yes (1)	50.40%	--	--	--	--

Table 12 Descriptive statistics for the country-level variables

Country-level variables	%	Mean	S.D.	Min.	Max.
Proportion victims	--	34.95	5.02	23.10	41.20
Incivilities concentration	--	36.27	13.05	17.02	60.95
GDP per capita (in €1000)	--	29.17	12.55	8.80	65.20
Unemployment rate	--	7.21	2.09	4.40	10.70

Table 13 Raw data for fear of crime frequency (continued on next page)

Count	Absolute numbers	%	Cumulative %
1	725	22.53%	22.53%
2	538	16.72%	39.25%
3	360	11.19%	50.44%
4	147	4.57%	55.00%
5	270	8.39%	63.39%
6	112	3.48%	66.87%
7	20	0.62%	67.50%
8	21	0.65%	68.15%
9	39	1.21%	69.36%
10	194	6.03%	75.39%
11	1	0.03%	75.42%
12	113	3.51%	78.93%
14	3	0.09%	79.02%
15	35	1.09%	80.11%
16	1	0.03%	80.14%
17	1	0.03%	80.17%
20	98	3.05%	83.22%
21	4	0.12%	83.34%
22	1	0.03%	83.37%
24	12	0.37%	83.75%
25	11	0.34%	84.09%
26	1	0.03%	84.12%
30	43	1.34%	85.46%
34	1	0.03%	85.49%
35	3	0.09%	85.58%
36	2	0.06%	85.64%
40	9	0.28%	85.92%
45	1	0.03%	85.95%
48	2	0.06%	86.02%
50	72	2.24%	88.25%
52	40	1.24%	89.50%
53	1	0.03%	89.53%
54	2	0.06%	89.59%
55	1	0.03%	89.62%
60	3	0.09%	89.71%
70	4	0.12%	89.84%
80	2	0.06%	89.90%
84	1	0.03%	89.93%
86	1	0.03%	89.96%
88	5	0.16%	90.12%
90	1	0.03%	90.15%
96	1	0.03%	90.18%
99	28	0.87%	91.05%
100	67	2.08%	93.13%
104	10	0.31%	93.44%
110	1	0.03%	93.47%
120	2	0.06%	93.54%
125	1	0.03%	93.57%
127	1	0.03%	93.60%
130	1	0.03%	93.63%

150	19	0.59%	94.22%
156	4	0.12%	94.34%
160	1	0.03%	94.38%
175	1	0.03%	94.41%
180	7	0.22%	94.62%
183	1	0.03%	94.66%
200	27	0.84%	95.49%
205	1	0.03%	95.53%
250	4	0.12%	95.65%
260	1	0.03%	95.68%
265	1	0.03%	95.71%
300	12	0.37%	96.08%
335	1	0.03%	96.12%
345	1	0.03%	96.15%
350	5	0.16%	96.30%
356	1	0.03%	96.33%
360	5	0.16%	96.49%
364	2	0.06%	96.55%
365	111	3.45%	100.00%
Total	3218	100.00%	

Table 14 Individual-level correlation matrix when fear of crime prevalence is the outcome

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Age[a] (1)	1						
Gender[a] (2)	0.047**	1					
Household combined annual income[b] (3)	-0.198**	-0.113**	1				
Victimization of property crimes[a] (4)	-0.005	-0.008	0.034**	1			
Victimization of personal crimes[a] (5)	-0.161**	0.043**	0.017**	0.147**	1		
Perception of drug related problems (incivilities)[a] (6)	-0.180**	-0.054**	0.028**	0.075**	0.163**	1	
Fear of crime prevalence[a] (7)	-0.105**	0.037**	0.020**	0.105**	0.231**	0.104**	1

*p<0,050 **p<0,010 ***p<0,001   [a]: Pearsons r; [b]: Spearmans ρ.

Table 15 Individual-level correlation matrix when fear of crime frequency is the outcome

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Age[a] (1)	1						
Gender[a] (2)	0.042*	1					
Household combined annual income[b] (3)	-0.105**	-0.041*	1				
Victimization of property crimes[a] (4)	-0.154**	-0.081**	-0.002	1			
Victimization of personal crimes[a] (5)	0.044*	-0.028	-0.021	0.090**	1		
Perception of drug related problems (incivilities)[a] (6)	-0.180**	0.003	-0.021	0.175**	0.139**	1	
Fear of crime frequency[a] (7)	0.118**	0.027	-0.024	0.020	0.101**	0.061**	1

*p<0,050 **p<0,010 ***p<0,001   [a]: Pearsons r; [b]: Spearmans ρ.

Table 16 Individual-level correlation matrix when fear of crime intensity is the outcome

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Age[b] (1)	1						
Gender[b] (2)	0.044*	1					
Household combined annual income[b] (3)	-0.105**	-0.041*	1				
Victimization of property crimes[b] (4)	0.053**	-0.018	-0.021	1			
Victimization of personal crimes[b] (5)	-0.185**	-0.003	-0.021	0.136**	1		
Perception of drug related problems (incivilities)[b] (6)	-0.150**	-0.081**	-0.002	0.095**	0.171**	1	
Fear of crime frequency[b] (7)	0.023	0.172**	-0.079**	0.083**	0.133**	0.058**	1

*p<0,050 **p<0,010 ***p<0,001   [b]: Spearmans ρ.

Table 17 Country-level correlation matrix

	(1)	(2)	(3)	(4)
Proportion victims[a] (1)	1			
Incivilities concentration[a] (2)	0,089	1		
GDP per capita (in €1000)[a] (3)	0,095	-0,326	1	
Unemployment rate[a] (4)	-0,233	0,294	-0,552*	1

N = 16
*p<0,050 **p<0,010 ***p<0,001   [a]: Pearsons *r*.

Appendix C: hierarchical structure of the data

Table 18 Hierarchical structure of the data

Country	Region	N
Austria	AT Wien	806
	AT11 Burgenland	36
	AT12 Niederösterreich	230
	AT13 Wien	234
	AT21 Kärnten	84
	AT22 Steiermark	177
	AT31 Oberösterreich	205
	AT32 Salzburg	78
	AT33 Tirol	101
	AT34 Vorarlberg	53
Belgium	BE Brussels	801
	BE10 Région De Bruxelles-Capitale/Brussels Hoofdstedlijk Gew	114
	BE21 Prov. Antwerpen	195
	BE22 Prov. Limburg (B)	94
	BE23 Prov. Oost-Vlaanderen	161
	BE24 Prov. Vlaams Brabant	120
	BE25 Prov. West-Vlaanderen	133
	BE31 Prov. Brabant Wallon	42
	BE32 Prov. Hainaut	151
	BE33 Prov. Liege	120
	BE34 Prov. Luxembourg (B)	30
	BE35 Prov. Namur	53
Denmark	DK Hovedstaden	267
	DK Kopenhagen	786
	DK Nordjylland, Midtjylland & Syddanmark	557
	DK Sjaelland	374
Finland	FI Helsinki	789
	FI13 Itä-Suomi	535
	FI18 Etelä-Suomi	669
	FI19 Länsi-Suomi	218
	FI1A Pohjois-Suomi	241
	FI20 Aland	1
	Mobile phone users	47
France	FR Paris	800
	FR10 Île De France	226
	FR21 Champagne-Ardenne	29
	FR22 Picardie	38
	FR23 Haute-Normandie	38
	FR24 Centre	52
	FR25 Basse-Normandie	30
	FR26 Bourgogne	34
	FR30 Nord - Pas-De-Calais	83
	FR41 Lorraine	47
	FR42 Alsace	36
	FR43 Franche-Comté	24
	FR51 Pays De La Loire	67
	FR52 Bretagne	60
	FR53 Poitou-Charentes	34
	FR61 Aquitaine	60
	FR62 Midi-Pyrénées	53
	FR63 Limousin	14

Country	Region	N
	FR71 Rhône-Alpes	117
	FR72 Auvergne	27
	FR81 Languedoc-Roussillon	48
	FR82 Provence-Alpes-Côte D'azur	93
	FR83 Corse	6
Germany	DE Berlin	823
	DE11 Stuttgart	58
	DE12 Karlsruhe	41
	DE13 Freiburg	33
	DE14 Tübingen	26
	DE21 Oberbayern	61
	DE22 Niederbayern	15
	DE23 Oberpfalz	16
	DE24 Oberfranken	16
	DE25 Mittelfranken	25
	DE26 Unterfranken	21
	DE27 Schwaben	27
	DE30 Berlin	46
	DE41-42 Brandenburg	41
	DE50 Bremen	10
	DE60 Hamburg	27
	DE71 Darmstadt	55
	DE72 Gießen	16
	DE73 Kassel	19
	DE80 Mecklenburg-Vorpommern	27
	DE91 Braunschweig	25
	DE92 Hannover	31
	DE93 Lüneburg	21
	DE94 Weser-Ems	35
	DEA1 Düsseldorf	78
	DEA2 Köln	63
	DEA3 Münster	39
	DEA4 Detmold	31
	DEA5 Arnsberg	61
	DEB1 Koblenz	22
	DEB2 Trier	7
	DEB3 Rheinhessen-Pfalz	28
	DEC1 Saarland	16
	DED1 Chemnitz	21
	DED2 Dresden	25
	DED3 Leipzig	8
	DEE1 Dessau	7
	DEE2 Halle	13
	DEE3 Magdeburg	18
	DEF0 Schleswig-Holstein	36
	DEG0 Thüringen	37
Greece	GR Athens	804
	GR11 Anatoliki Makedonia, Thraki	65
	GR12 Kentriki Makedonia	207
	GR13 Dytiki Makedonia	36
	GR14 Thessalia	86
	GR21 Ipeiros	44

Country	Region	Value
	GR22 Ionia Nisia	24
	GR23 Dytiki Ellada	86
	GR24 Sterea Ellada	78
	GR25 Peloponnisos	77
	GR30 Attiki	394
	GR41 Voreio Aigaio	22
	GR42 Notio Aigaio	32
	GR43 Kriti	65
Ireland	IE Dublin	801
	IE01 Border, Midland And Western	294
	IE02 Southern And Eastern	908
Italy	IT Rome	804
	ITC1 Piemonte	90
	ITC2 Valle D'aosta/Vallée D'aoste	4
	ITC3 Liguria	35
	ITC4 Lombardia	190
	ITD1 Provincia Autonoma Bolzano/Bozen	21
	ITD3 Veneto	97
	ITD4 Friuli-Venezia Giulia	26
	ITD5 Emilia-Romagna	86
	ITE1 Toscana	75
	ITE2 Umbria	18
	ITE3 Marche	30
	ITE4 Lazio	112
	ITF1 Abruzzo	28
	ITF2 Molise	8
	ITF3 Campania	121
	ITF4 Puglia	84
	ITF5 Basilicata	9
	ITF6 Calabria	43
	ITG1 Sicilia	107
	ITG2 Sardegna	35
Luxembourg	LU Luxemburg	800
The Netherlands	NL Amsterdam	801
	NL11 Groningen	45
	NL12 Friesland	48
	NL13 Drenthe	36
	NL21 Overijssel	82
	NL22 Gelderland	127
	NL23 Flevoland	47
	NL31 Utrecht	84
	NL32 Noord-Holland	190
	NL33 Zuid-Holland	257
	NL34 Zeeland	28
	NL41 Noord-Brabant	179
	NL42 Limburg (Nl)	86
Portugal	PT Lisbon	801
	PT11 Norte	437
	PT15 Algarve	46
	PT16 Centro (Pt)	272
	PT17 Lisboa	308
	PT18 Alentejo	91
	PT20 Regiao Autónoma Dos Açores (Pt)	28
	PT30 Regiao Autónoma Da Madeira (Pt)	28
Spain	ES Madrid	840

Country	Region	Value
	ES11 Galicia	83
	ES12 Asturias	33
	ES13 Cantabria	17
	ES21 País Vasco	63
	ES22 Navarra	16
	ES23 La Rioja	8
	ES24 Aragón	35
	ES30 Madrid	138
	ES41 Castilla Y León	73
	ES42 Castilla-La Mancha	53
	ES43 Extremadura	32
	ES51 Cataluna	186
	ES52 Comunidad Valenciana	122
	ES53 Baleares	25
	ES61 Andalucía	218
	ES62 Murcia	35
	ES63-64 Ceuta Y Melilla	5
	ES70 Canarias	52
	SE Stockholm	802
	SE01 Stockholm	254
	SE02 Östra Mellansverige	206
	SE04 Sydsverige	166
Sweden	SE06 Norra Mellansverige	115
	SE07 Mellersta Norrland	49
	SE08 Övre Norrland	69
	SE09 Smaland med öarna	108
	SE0A Västsverige	243
	UK London	800
	UKC1 Tees Valley and Durham	24
	UKC2 Northumberland, Tyne and Wear	36
	UKD1 Cumbria	12
	UKD2 Cheshire	19
	UKD3 Greater Manchester	49
	UKD4 Lancashire	29
	UKD5 Merseyside	33
	UKE1 East Riding and North Lincolnshire	17
	UKE2 North Yorkshire	22
	UKE3 South Yorkshire	30
	UKE4 West Yorkshire	28
United Kingdom (including Wales, Scotland and Northern-Ireland)	UKF1 Derbyshire and Nottinghamshire	50
	UKF2 Leicestershire, Rutland and Northants	32
	UKF3 Lincolnshire	12
	UKG1 Herefordshire, Worcestershire and Warks	30
	UKG2 Shropshire and Staffordshire	43
	UKG3 West Midlands	31
	UKH1 East Anglia	45
	UKH2 Bedfordshire, Hertfordshire	27
	UKH3 Essex	34
	UKI1 Inner London	40
	UKI2 Outer London	62
	UKJ1 Berkshire, Bucks and Oxfordshire	38
	UKJ2 Surrey, East and West	59

	Sussex	
	UKJ3 Hampshire and Isle of Wight	39
	UKJ4 Kent	40
	UKK1 Gloucestershire, Wiltshire and North Somerset	54
	UKK2 Dorset and Somerset	44
	UKK3 Cornwall and Isles of Scilly	11
	UKK4 Devon	34
	UKL1 West Wales and The Valleys	39
	UKL2 East Wales	30
	UKM1 North Eastern Scotland	3
	UKM2 Eastern Scotland	32
	UKM3 South Western Scotland	38
	UKM4 Highlands and Islands	7
	UKN0 Northern Ireland	31
Hungary	HU Budapest	865
	HU10 Közép-Magyarország	347
	HU21 Közép-Dunántúl	136
	HU22 Nyugat-Dunántúl	127
	HU23 Dél-Dunántúl	116
	HU31 Észak-Magyarország	164
	HU32 Észak-Alföld	187
	HU33 Dél-Alföld	161
Total		31563

Appendix D: selected output for categorical principal components analysis (CATPCA)

Credit

CATPCA

Version 1.1

by

Data Theory Scaling System Group (DTSS)

Faculty of Social and Behavioral Sciences

Leiden University, The Netherlands

Case Processing Summary

Valid Active Cases	31308
Active Cases with Missing Values	255
Supplementary Cases	0
Total	31563
Cases Used in Analysis	31563

Model Summary

Dimension	Cronbach's Alpha	Variance Accounted For	
		Total (Eigenvalue)	% of Variance
1	,407	1,513	25,222
2	,100	1,092	18,198
Total	,739[a]	2,605	43,420

a. Total Cronbach's Alpha is based on the total Eigenvalue.

Joint Plot of Category Points

Variable Principal Normalization.
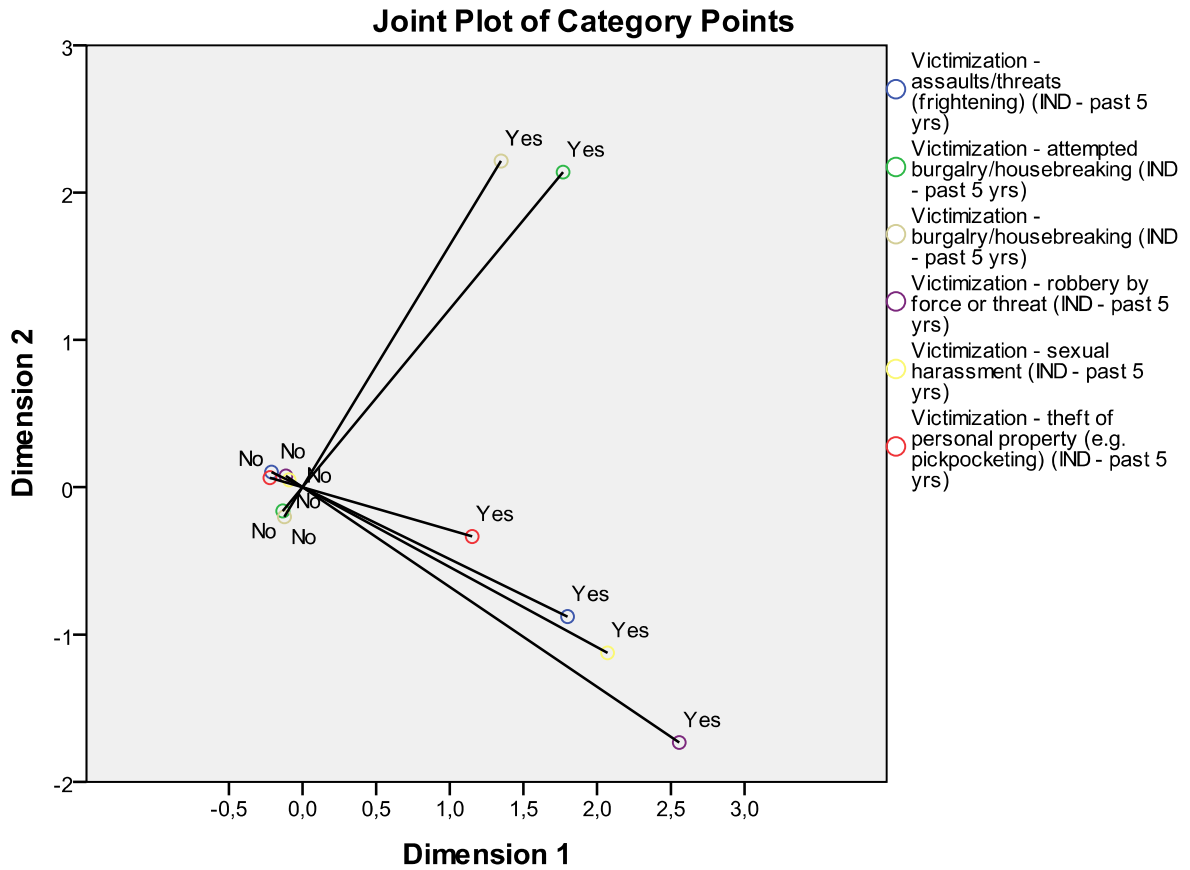
Component Loadings

	Dimension	
	1	2
Victimization - burgalry/housebreaking (IND - past 5 yrs)	,407	,668
Victimization - attempted burgalry/housebreaking (IND - past 5 yrs)	,486	,588
Victimization - robbery by force or threat (IND - past 5 yrs)	,536	-,363
Victimization - theft of personal property (e.g. pickpocketing) (IND - past 5 yrs)	,505	-,147
Victimization - sexual harassment (IND - past 5 yrs)	,436	-,237

Victimization - assaults/threats (frightening) (IND - past 5 yrs)	,616	-,301

Variable Principal Normalization.

Component Loadings
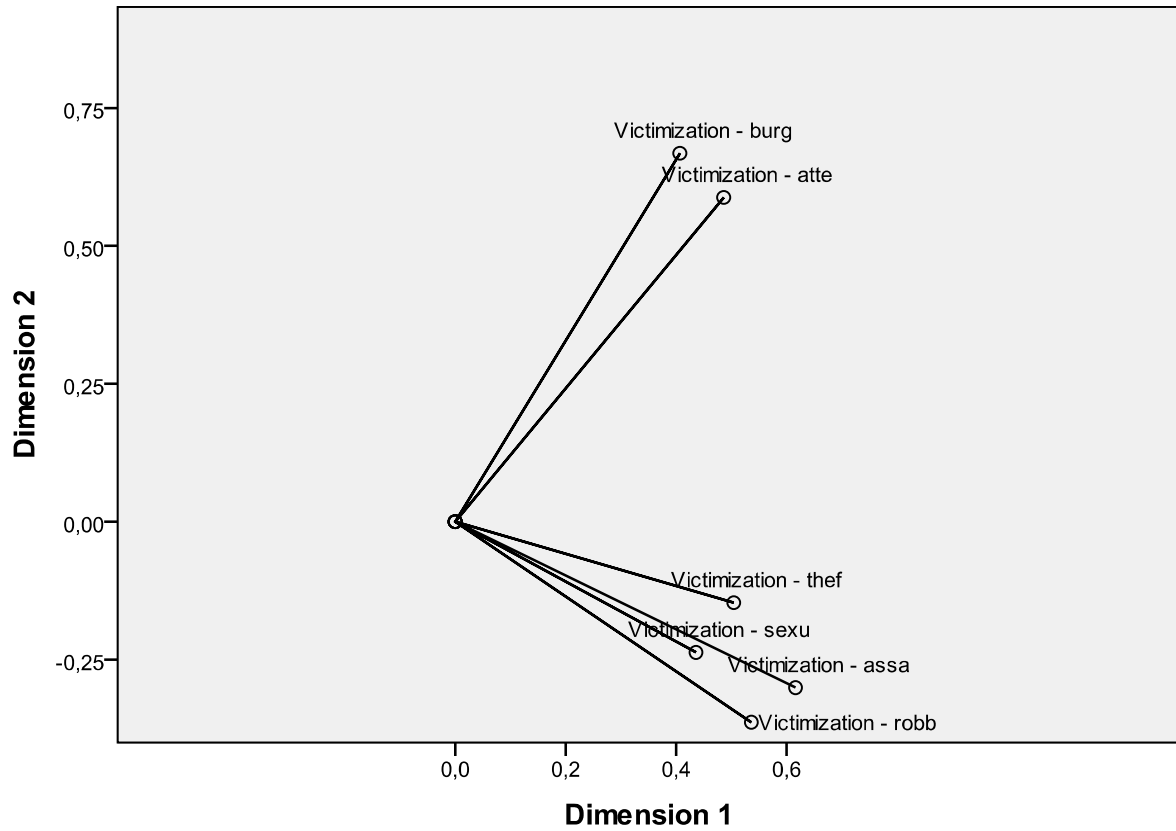
Variable Principal Normalization.

Appendix E: Selected output for multilevel logistic regression models

Table 19 Estimated regression coefficients and corresponding standard errors for the multilevel logistic regression models with fear of crime prevalence (0 = no, 1 = yes) as independent variable

	Model 1 (intercept-only)		Model 2 (vulnerability)		Model 3 (victimization)		Model 4 (incivilities)		Model 5 (combined individual)		Model 6 (individual & country)	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Constant	-2.364	0.133	-2.437	0.148	-2.789	0.132	-2.666	0.141	-3.041	0.154	-3.043	0.151
Vulnerability variables												
Age[a]	--	--	-0.022	0.001	--	--	--	--	-0.015	0.001	-0.015	0.001
Gender[b] – female	--	--	0.344	0.040	--	--	--	--	0.324	0.044	0.322	0.043
Household combined annual income[c]												
> bottom 25% but < median income (2)	--	--	-0.234	0.065	--	--	--	--	-0.187	0.071	-0.188	0.070
> median income but < top 75% (3)	--	--	-0.174	0.064	--	--	--	--	-0.078	0.071	0.081	0.070
> top 75% (4)	--	--	-0.144	0.062	--	--	--	--	-0.101	0.067	-0.104	0.067
Missing (5)	--	--	-0.455	0.072	--	--	--	--	-0.325	0.077	-0.325	0.077
Victimization variables												
Victimization of property crimes[d]	--	--	--	--	0.446	0.039	--	--	0.447	0.047	0.446	0.040
Victimization of personal crimes[e]	--	--	--	--	0.790	0.024	--	--	0.686	0.025	0.686	0.025
Incivilities variable			--	--								
Perception of drug related problems[f] – yes	--	--	--	--	--	--	0.747	0.040	0.478	0.043	0.479	0.043
Country-level variables												
Proportion victims[g]	--	--	--	--	--	--	--	--	--	--	0.005	0.030
Incivilities concentration[h]	--	--	--	--	--	--	--	--	--	--	-0.010	0.011
GDP per capita (in €1000)[i]	--	--	--	--	--	--	--	--	--	--	-0.009	0.014
Unemployment rate[j]	--	--	--	--	--	--	--	--	--	--	-0.140	0.082
$\sigma^2_{level-3}$	0.257	0.117	0.276	0.127	0.256	0.115	0.290	0.131	0.289	0.129	0.280	0.157
$\sigma^2_{level-2}$	0.082	0.021	0.075	0.020	0.041	0.016	0.060	0.018	0.030	0.014	0.032	0.015
$\sigma^2_{level-1}$	1.000	0.000	1.000	0.000	1.000	0.000	1.000	0.000	1.000	0.000	1.000	0.000
DIC	20306.423		19734.464		18800.901		19278.448		17717.568		17717.135	
$N_{level-3}$	16		16		16		16		16		16	
$N_{level-2}$	231		231		231		230		230		230	
$N_{level-1}$	31563		31365		31308		30675		30271		30271	

a: centered around grand median (48). b: ref.cat. is male (0). c: ref.cat. is < bottom 25% (1). d: centered around minimum (2). e: centered around minimum (4). f: ref.cat. is no (0). g: centered around the grand mean (34.95). h: centered around the grand mean (36.27). i: centered around the grand mean (29.17). j: centered around the grand mean (7.21). k: the ICC for the region level is printed.

Appendix F: selected output for multilevel negative binomial regression models

Table 20 Estimated regression coefficients and corresponding standard errors for the multilevel negative binomial regression models with fear of crime frequency as independent variable

	Model 1 (intercept-only)		Model 2 (vulnerability)		Model 3 (victimization)		Model 4 (incivilities)		Model 5 (combined individual)		Model 6 (individual & country)	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Constant	3.138	0.178	3.060	0.208	2.806	0.180	2.960	0.184	2.695	0.219	2.633	0.212
Vulnerability variables												
Age[a]	--	--	0.018	0.003	--	--	--	--	0.020	0.003	0.020	0.003
Gender[b] – female	--	--	-0.071	0.101	--	--	--	--	-0.083	0.100	-0.076	0.105
Household combined annual income[c]												
> bottom 25% but < median income (2)	--	--	-0.052	0.165	--	--	--	--	-0.054	0.163	-0.038	0.170
> median income but < top 75% (3)	--	--	-0.116	0.163	--	--	--	--	-0.031	0.161	-0.023	0.168
> top 75% (4)	--	--	-0.035	0.156	--	--	--	--	-0.038	0.153	-0.028	0.160
Missing (5)	--	--	-0.038	0.181	--	--	--	--	0.023	0.179	0.040	0.187
Victimization variables												
Victimization of property crimes[d]	--	--	--	--	0.343	0.088	--	--	0.327	0.087	0.335	0.091
Victimization of personal crimes[e]	--	--	--	--	0.156	0.053	--	--	0.195	0.053	0.196	0.056
Incivilities variable			--	--								
Perception of drug related problems[f] – yes	--	--	--	--	--	--	0.195	0.101	0.118	0.100	0.124	0.104
Country-level variables												
Proportion victims[g]	--	--	--	--	--	--	--	--	--	--	0.078	0.036
Incivilities concentration[h]	--	--	--	--	--	--	--	--	--	--	-0.021	0.013
GDP per capita (in €1000)[i]	--	--	--	--	--	--	--	--	--	--	-0.019	0.017
Unemployment rate[j]	--	--	--	--	--	--	--	--	--	--	-0.053	0.096
$\sigma^2_{level-3}$	0.292	0.172	0.415	0.164	0.437	0.171	0.453	0.177	0.433	0.169	0.347	0.143
$\sigma^2_{level-2}$	1.906	0.201	0.008	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\sigma^2_{level-1}$	1.000	0.000	1.000	0.000	1.000	0.000	1.000	0.000	1.000	0.000	1.000	0.000
Over-dispersion param.	0.000	0.000	6.779	0.176	6.914	0.179	7.078	0.183	6.588	0.171	7.181	0.186
$N_{level-3}$	16		16		16		16		16		16	
$N_{level-2}$	197		197		197		197		197		197	
$N_{level-1}$	3056		3056		3056		3056		3056		3056	

[a]: centered around grand median (41). [b]: ref.cat. is male (0). [c]: ref.cat. is < bottom 25% (1). [d]: centered around minimum (2). [e]: centered around minimum (4). [f]: ref.cat. is no (0). [g]: centered around the grand mean (34.95). [h]: centered around the grand mean (36.27). [i]: centered around the grand mean (29.17). [j]: centered around the grand mean (7.21).

Appendix G: selected output for multilevel ordered multinomial logistic regression models

Table 21 Estimated regression coefficients and corresponding standard errors for the multilevel ordered multinomial regression models with fear of crime intensity (1 = not very fearful, 2 = a little bit fearful, 3 = quite fearful, 4 = very fearful; ref.cat. is 'not very fearful') as independent variable and specified with common coefficients

	Model 1 (intercept-only)		Model 2 (vulnerability)		Model 3 (victimization)		Model 4 (incivilities)		Model 5 (combined individual)		Model 6 (individual & country)	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Constant/threshold	1.953	0.096	2.632	0.134	1.736	0.097	1.884	0.099	2.325	0.138	2.343	0.135
Threshold 2	-0.049	0.087	0.578	0.124	-0.286	0.090	-0.119	0.091	0.246	0.129	0.261	0.128
Threshold 3	-1.716	0.095	-1.135	0.126	-1.979	0.098	-1.786	0.098	-1.495	0.134	-1.483	0.131
Vulnerability variables												
Age[a]	--	--	0.000	0.002	--	--	--	--	0.003	0.002	0.003	0.002
Gender[b] – female	--	--	-0.667	0.072	--	--	--	--	-0.683	0.073	-0.681	0.073
Household combined annual income[c]												
> bottom 25% but < median income (2)	--	--	-0.361	0.119	--	--	--	--	-0.354	0.120	-0.360	0.120
> median income but < top 75% (3)	--	--	-0.358	0.116	--	--	--	--	-0.313	0.117	-0.322	0.117
> top 75% (4)	--	--	-0.633	0.112	--	--	--	--	-0.613	0.111	-0.613	0.112
Missing (5)	--	--	-0.478	0.130	--	--	--	--	-0.423	0.130	-0.440	0.130
Victimization variables												
Victimization of property crimes[d]	--	--	--	--	0.201	0.063	--	--	0.202	0.064	0.200	0.064
Victimization of personal crimes[e]	--	--	--	--	0.249	0.038	--	--	0.252	0.039	0.251	0.039
Incivilities variable			--	--								
Perception of drug related problems[f] – yes	--	--	--	--	--	--	0.141	0.069	0.125	0.073	0.110	0.072
Country-level variables												
Proportion victims[g]	--	--	--	--	--	--	--	--	--	--	0.020	0.018
Incivilities concentration[h]	--	--	--	--	--	--	--	--	--	--	0.009	0.007
GDP per capita (in €1000)[i]	--	--	--	--	--	--	--	--	--	--	-0.002	0.009
Unemployment rate[j]	--	--	--	--	--	--	--	--	--	--	0.042	0.048
$\sigma^2_{level-3}$	0.090	0.048	0.097	0.052	0.081	0.047	0.083	0.047	0.082	0.048	0.074	0.053
$\sigma^2_{level-2}$	0.020	0.021	0.014	0.017	0.021	0.021	0.019	0.022	0.014	0.016	0.014	0.016
$\sigma^2_{level-1}$	--	--	--	--	--	--	--	--	--	--	--	--
DIC	7752.812		7636.331		7698.060		7751.373		7577.792		7578.572	
$N_{level-3}$	16		16		16		16		16		16	
$N_{level-2}$	199		199		199		199		199		199	
$N_{level-1}$	3031		3031		3031		3031		3031		3031	

[a]: centered around grand median (41). [b]: ref.cat. is male (0). [c]: ref.cat. is < bottom 25% (1). [d]: centered around minimum (2). [e]: centered around minimum (4). [f]: ref.cat. is no (0). [g]: centered around the grand mean (34.95). [h]: centered around the grand mean (36.27). [i]: centered around the grand mean (29.17). [j]: centered around the grand mean (7.21).

Table 22 Estimated regression coefficients and corresponding standard errors for the multilevel ordered multinomial regression models with fear of crime intensity (1 = not very fearful, 2 = a little bit fearful, 3 = quite fearful, 4 = very fearful; ref.cat. is 'not very fearful') as independent variable and specified with separate coefficients (continued on following two pages)

| | Model 1 (intercept-only) | | | | | | Model 2 (vulnerability) | | | | | |
| | ≥ a little bit fearful | | ≥ quite fearful | | ≥ very fearful | | ≥ a little bit fearful | | ≥ quite fearful | | ≥ very fearful | |
	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Constant/threshold	1.953	0.096	-0.049	0.087	-1.716	0.095	2.629	0.189	0.414	0.130	-0.891	0.140
Vulnerability variables												
Age[a]	--	--	--	--	--	--	-0.005	0.003	0.000	0.002	0.004	0.003
Gender[b] – female	--	--	--	--	--	--	-0.690	0.111	-0.654	0.080	-0.706	0.123
Household combined annual income[c]												
> bottom 25% but < median income (2)	--	--	--	--	--	--	-0.422	0.209	-0.199	0.131	-0.546	0.158
> median income but < top 75% (3)	--	--	--	--	--	--	-0.196	0.211	-0.194	0.129	-0.718	0.159
> top 75% (4)	--	--	--	--	--	--	-0.549	0.194	-0.448	0.122	-1.087	0.159
Missing (5)	--	--	--	--	--	--	-0.624	0.218	-0.258	0.141	-0.728	0.179
Victimization variables												
Victimization of property crimes[d]	--	--	--	--	--	--	--	--	--	--	--	--
Victimization of personal crimes[e]	--	--	--	--	--	--	--	--	--	--	--	--
Incivilities variable												
Perception of drug related problems[f] – yes	--	--	--	--	--	--	--	--	--	--	--	--
Country-level variables												
Proportion victims[g]	--	--	--	--	--	--	--	--	--	--	--	--
Incivilities concentration[h]	--	--	--	--	--	--	--	--	--	--	--	--
GDP per capita (in €1000)[i]	--	--	--	--	--	--	--	--	--	--	--	--
Unemployment rate[j]	--	--	--	--	--	--	--	--	--	--	--	--
$\sigma^2_{level-3}$ (S.E.)			0.090 (0.048)						0.097 (0.055)			
$\sigma^2_{level-2}$ (S.E.)			0.020 (0.021)						0.014 (0.016)			
$\sigma^2_{level-1}$ (S.E.)			--						--			
DIC			7752.812						7627.782			
$N_{level-3}$			16						16			
$N_{level-2}$			199						199			
$N_{level-1}$			3031						3031			

[a]: centered around grand median (41). [b]: ref.cat. is male (0). [c]: ref.cat. is < bottom 25% (1). [d]: centered around minimum (2). [e]: centered around minimum (4). [f]: ref.cat. is no (0). [g]: centered around the grand mean (34.95). [h]: centered around the grand mean (36.27). [i]: centered around the grand mean (29.17). [j]: centered around the grand mean (7.21).
Note: table continued on following page.

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| | Model 3 (victimization) | | | | | | Model 4 (incivilities) | | | | | |
| | ≥ a little bit fearful | | ≥ quite fearful | | ≥ very fearful | | ≥ a little bit fearful | | ≥ quite fearful | | ≥ very fearful | |
	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Constant/threshold	1.826	0.106	-0.284	0.092	-2.077	0.107	1.883	0.107	-0.128	0.093	-1.753	0.106
Vulnerability variables												
Age[a]	--	--	--	--	--	--	--	--	--	--	--	--
Gender[b] – female	--	--	--	--	--	--	--	--	--	--	--	--
Household combined annual income[c]												
> bottom 25% but < median income (2)	--	--	--	--	--	--	--	--	--	--	--	--
> median income but < top 75% (3)	--	--	--	--	--	--	--	--	--	--	--	--
> top 75% (4)	--	--	--	--	--	--	--	--	--	--	--	--
Missing (5)	--	--	--	--	--	--	--	--	--	--	--	--
Victimization variables												
Victimization of property crimes[d]	0.062	0.106	0.187	0.069	0.295	0.085	--	--	--	--	--	--
Victimization of personal crimes[e]	0.162	0.065	0.242	0.042	0.309	0.052	--	--	--	--	--	--
Incivilities variable												
Perception of drug related problems[f] – yes	--	--	--	--	--	--	0.150	0.111	0.162	0.076	0.078	0.103
Country-level variables												
Proportion victims[g]	--	--	--	--	--	--	--	--	--	--	--	--
Incivilities concentration[h]	--	--	--	--	--	--	--	--	--	--	--	--
GDP per capita (in €1000)[i]	--	--	--	--	--	--	--	--	--	--	--	--
Unemployment rate[j]	--	--	--	--	--	--	--	--	--	--	--	--
$\sigma^2_{level-3}$ (S.E.)			0.083 (0.048)						0.083 (0.048)			
$\sigma^2_{level-2}$ (S.E.)			0.020 (0.023)						0.021 (0.022)			
$\sigma^2_{level-1}$ (S.E.)			--						--			
DIC			7697.098						7754.591			
$N_{level-3}$			16						16			
$N_{level-2}$			199						199			
$N_{level-1}$			3031						3031			

a: centered around grand median (41). b: ref.cat. is male (0). c: ref.cat. is < bottom 25% (1). d: centered around minimum (2). e: centered around minimum (4). f: ref.cat. is no (0). g: centered around the grand mean (34.95). h: centered around the grand mean (36.27). i: centered around the grand mean (29.17). j: centered around the grand mean (7.21).

Note: table continued on following page.

Table 22 continued

	Model 5 (combined individual)						Model 6 (individual & country)					
	≥ a little bit fearful		≥ quite fearful		≥ very fearful		≥ a little bit fearful		≥ quite fearful		≥ very fearful	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Constant/threshold	2.436	0.201	0.078	0.136	-1.324	0.156	2.441	0.203	0.076	0.135	-1.298	0.155
Vulnerability variables												
Age[a]	-0.003	0.003	0.003	0.002	0.007	0.003	-0.003	0.003	0.003	0.002	0.007	0.003
Gender[b] – female	-0.708	0.112	-0.673	0.082	-0.746	0.123	-0.718	0.112	-0.672	0.081	-0.739	0.124
Household combined annual income[c]												
> bottom 25% but < median income (2)	-0.408	0.208	-0.201	0.130	-0.521	0.158	-0.423	0.208	-0.198	0.220	-0.522	0.159
> median income but < top 75% (3)	-0.179	0.211	-0.148	0.129	-0.673	0.159	-0.207	0.212	-0.147	0.130	-0.687	0.160
> top 75% (4)	-0.535	0.192	-0.431	0.122	-1.093	0.159	-0.542	0.196	-0.427	0.122	-1.071	0.161
Missing (5)	-0.597	0.219	-0.205	0.141	-0.661	0.179	-0.556	0.220	-0.213	0.143	-0.705	0.180
Victimization variables												
Victimization of property crimes[d]	0.066	0.108	0.192	0.071	0.310	0.087	0.047	0.108	0.196	0.070	0.305	0.087
Victimization of personal crimes[e]	0.129	0.068	0.244	0.044	0.341	0.054	0.115	0.068	0.245	0.044	0.347	0.054
Incivilities variable												
Perception of drug related problems[f] – yes	0.163	0.115	0.147	0.079	0.031	0.107	0.151	0.117	0.144	0.080	-0.025	0.110
Country-level variables												
Proportion victims[g]	--	--	--	--	--	--	0.047	0.108	0.020	0.018	0.005	0.019
Incivilities concentration[h]	--	--	--	--	--	--	0.005	0.008	0.007	0.007	0.015	0.007
GDP per capita (in €1000)[i]	--	--	--	--	--	--	-0.003	0.011	-0.002	0.009	-0.004	0.010
Unemployment rate[j]	--	--	--	--	--	--	-0.020	0.056	0.052	0.049	0.078	0.053
$\sigma^2_{level-3}$ (S.E.)	0.086 (0.048)						0.074 (0.053)					
$\sigma^2_{level-2}$ (S.E.)	0.014 (0.017)						0.014 (0.017)					
$\sigma^2_{level-1}$ (S.E.)	--						--					
DIC	7566.493						7559.353					
$N_{level-3}$	16						16					
$N_{level-2}$	199						199					
$N_{level-1}$	3031						3031					

[a]: centered around grand median (41). [b]: ref.cat. is male (0). [c]: ref.cat. is < bottom 25% (1). [d]: centered around minimum (2). [e]: centered around minimum (4). [f]: ref.cat. is no (0). [g]: centered around the grand mean (34.95). [h]: centered around the grand mean (36.27). [i]: centered around the grand mean (29.17). [j]: centered around the grand mean (7.21).

Author note

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