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S. Douhou, A. van Soest

Explaining subjective well-being: the role of victimization, trust, health, and social norms[1]

This paper extends research on the relation between crime and happiness by investigating the impact of serious and less serious crime (i.e. incorrect behavior) on subjective well-being using a representative survey of the Dutch adult population in 2008. We also control for variables reflecting trust, health and social norms, in addition to standard demographic and socio-economic characteristics. We find that people who feel healthy, have more trust in others and have higher social norms are in general happier. We find evidence of an indirect effect of victimization on well-being via trust, health and social norms. The remaining effect of victimization on well-being, keeping trust, social norms, and health constant, is quite weak.

Keywords: happiness; crime; trust; health; victimization; social norms; fear of crime.

JEL classification: C35; C36; D60; I31; J10; K42.

1. Introduction

No scholar would disagree with the statement that crime is costly. *How* costly crime is has not led to an unambiguous answer, as different methodologies and definitions of crime have led to different results. Scholars have relied on three types of methodologies to estimate the cost of crime: (i) revealed preference methods (mainly using the impact of crime on housing prices; see, e.g., Gibbons, 2004), (ii) stated preference methods (leading to "willingness-to-pay" estimates for avoiding crime; see, e.g., Dolan et al., 2005), and (iii) subjective well-being surveys (see, e.g., Di Tella and MacCulloch, 2008). The costs of crime can be classified as either direct, as a result of law enforcement and deterrence, or indirect, by means of, for example, lower housing prices or costs of medical care to fearful non-victims. Dolan and Moore (2007), for example, distinguish between tangible and intangible victim costs in this respect, while Cornaglia and Leigh (2011) call this economic and social costs of crime, which essentially means the same. Research on the costs of crime is important as it provides insight in where losses from crime are highest and, therefore, helps to analyze policy measures to reduce the economic and social burden that crime puts on society.

This paper uses the third method to analyze the importance of crime. Our goal is to rethink and estimate the relation between crime measures and well-being (or "happiness"), thereby also considering other variables that affect happiness. We will use cross-sectional survey data to analyze the association between crime and subjective well-being. Since there is no single measure of crime that captures all concepts related to a criminal action, we will look at different types of measures of crime. We will use data on personal victimization where we distinguish different types of crime, but we will also consider the effects of the frequency of crimes and the fear for crimes in the region.

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Victimization is of a complex nature as it influences well-being in many ways: in terms of physical and mental health, but also economically and through the individuals' perception of their surroundings. It is a misconception that this only holds for victims: non-victims suffer from fear of crime in their neighborhood and as a result display lower mental health (see, e.g., Cornaglia and Leigh, 2011) and take precautionary measures against victimization. We find that victimization is not only related to the usual variables that capture personal victimization and fear in the area of residence but that it is also associated with health and social capital. The cross-sectional nature of our data and limited information available for our survey respondents do not allow us to determine whether such associations are causal. This makes our analysis less ambitious than, for example, Cornaglia and Leigh (2011) who use panel data to identify the causal effect of crime on mental health.

A second aim of this paper is to look at the well-known victimization–fear paradox: a general finding in crime surveys is the large gap between fear of crime and actual victimization. We find that indeed women and elderly are the least victimized, and estimate how men and women and younger and older respondents differ in terms of the association of victimization with fear in their area of residence on their well-being. The results show that the relations are different for the subgroups under investigation.

The data we use in this paper come from several sources. We matched survey responses from a survey on incorrect behavior (see Douhou et al., 2011) with other surveys that have been set out in the same pool of respondents (the CentERpanel) in the same year (2008). Furthermore, we matched these data to administrative data on victimization and fear of crime figures in their region of residence. Other than existing studies, we use broad measures of personal victimization and distinguish between two crime types: serious (assault, robbery, etc.) and small (breaking a mug, littering, etc.). In addition, we also consider the roles of health, trust, and social norms in driving well-being and investigate whether controlling for these factors changes the relation between victimization and subjective well-being.

We try to contribute to three strands of the existing literature. First, studies that look at the association between crime and individuals' subjective well-being. See, e.g., DiTella and MacCulloch (2008); Michalos and Zumbo (2000); Møller (2005). Second, the literature on the effect of social capital, which is assumed to be a combination of trust, social norms, and associational activity, on well-being. See, e.g., Bjørnskov (2003) and Helliwell (2003). The analysis of the relation between (self-reported) health and personal victimization is the third literature stream: some references are (see Koss et al., 1990, 1991, and Britt, 2001). Section 2 briefly discusses the main mechanisms that lead to an association between crime, well-being, social norms, trust, and health. In Section 3 we provide more details of the literature we try to connect our research to. Section 4 describes the data and provides some summary statistics. The empirical methodology and the empirical results are presented in Section 5. Section 6 concludes.

2. Crime, fear of crime, trust, health, social norms, and well-being

It is impossible to capture the consequences of crime to which a person is exposed to in one measure. We use personal victimization experience and victimization and fear of crime rates in the respondent's area of residence as direct measures of crime. The latter two variables are also relevant to non-victims as frequent crimes in the neighborhood may lead to a drop in subjective well-being. In addition to creating feelings of fear and anxiety, frequent crime may make people feel less free in their daily routine and may make them take precautionary measures to deter future victimization. On the other hand, it might also be the case that people avoid living in certain areas because they are concerned about crime, leading to a sorting effect of an individual's attitude towards crimes on the crime rate in the area. Denkers and Winkel (1998) find that people with lower well-being are more likely to be victimized and people with lower happiness are living in areas with higher crime. In this paper we will distinguish between two types of crime a respondent can be a victim of: (i) serious crime (e.g., assault and robbery) and (ii) incorrect behavior (or "small crime", such as damaging a car and fare dodging). We expect the association between well-being and serious crime victimization to be stronger than the association between well-being and small crimes. The latter are more widespread and we expect their effect on well-being to be more of a transitory kind.

Happiness is about how we think and feel about our lives and is therefore related to perception of safety and security, norms and values, and (self-reported) health. We will consider indexes measuring these concepts and their association with subjective well-being, controlling for individual characteristics such as age and income. Someone who has been the victim of a crime may experience lower mental health, and perhaps also lower physical health. Moreover, a person's perception of life may change – changing trust in others or the person's social norms.

3. Background

Long before economists started to get interested in "happiness", researchers in the field of psychology were already working on this topic; see, for example, the review articles of Diener et al. (1999) and Frey and Stutzer (2002). The paradox that is revealed in (Easterlin, 1974) regarding the relation between income and happiness triggered the interest of economists, starting with Inglehart (1996) and Blanchflower and Oswald (2004). Economists have not only looked at the link between happiness and income, but also at the relation between happiness and, to name a few, unemployment (Clark and Oswald, 1994; Winkelmann and Winkelmann, 1998), macroeconomic volatility (Di Tella et al., 2003), airport noise (Van Praag and Baarsma, 2005), social capital (Bjørnskov, 2003, 2006; Helliwell, 2003, 2006), and inequality (Alesina et al., 2004). Other studies look at alternative measures of well-being such as indicators of mental health problems. A recent example is Cornaglia and Leigh (2011) who look at the crime-mental health interaction. In this paper we will focus on happiness as the measure of well-being and we will focus on several determinants of happiness: crime victimization, trust, (physical) health, and social norms.

The analysis of the link between well-being and crime also has its roots in psychology and sociology.

The focus has mainly been on the psychological effects of having been a victim of a crime on well-being, e.g. through anxiety and fear; see the studies cited in Powdthavee (2005) and Di Tella et al. (2008). Some studies have also analyzed the effects of crime on (subjectively measured physical) health (see Britt, 2001; Koss et al., 1990, 1991). Their main conclusion is that the expected negative association between victimization and health exists: people have significantly worse health after they have been the victim of a crime and more severe crimes are associated with health problems. Other studies have focussed on crime victimization and well-being: Michalos and Zumbo (2000) look at the relation between quality of life and crime-related issues such as fear and actual cases of victimization, neighborhood safety, and beliefs about increases in local crime. They find that victims and non-victims differ in their satisfaction with life but not in a convincing way. With regards to neighborhood satisfaction, the reported difference between victims and non-victims is much higher. Furthermore, these authors find that crime-related issues account for only 7% of the variation in satisfaction with life while explaining 38% of the variation in neighborhood satisfaction. Møller (2005) conducts a similar study using South African data and finds that actual victimization is not as good a predictor of well-being as fear of victimization or personal safety.

Powdthavee (2005) analyzed South African survey data among heads of households regarding the perceived quality of life of the household as a whole. The author relates subjective well-being to information on victimization in the past 12 months of one of the household members in a multiple regression analysis, controlling also for socio-economic characteristics of the household head. Victimized households report significantly lower well-being and if a household lives in a region with a high crime rate this also appears to have a negative effect on well-being. A similar study by Kingdon and Knight (2006), also using South African data, confirmed that household victimization has a significant and negative effect on well-being. In a similar vein, Davies and Hinks (2010) use Malawian survey data and include victimization of the household head and the regional crime rate, but also whether the respondent feels unsafe. As expected, feelings of insecurity and victimization (personal and regional) have a detrimental impact on happiness.

Denkers and Winkel (1998) focus on the influence of victimization on well-being and fear using a sample from the Dutch population.[2] They found no difference between the well-being of victims of violent crime and property crime, but a significant difference between victims and non-victims. Moreover, they found that victims of a crime already appear to be more fearful before they become the victim of a crime and their fear does not seem to change after the crime.

Di Tella and MacCulloch (2008) use happiness responses from a random sample of Europeans (Euro-Barometer Survey Series) and Americans (General Social Survey) for the period 1975–1997. They include aggregate measures as they want to investigate the effect of macroeconomic indicators such as income, unemployment, inflation, and the (violent) crime rate on happiness. The effect of the crime rate is negative in

[2] The survey used for this study was carried out in the Telepanel, a predecessor of the CentERpanel which was used to collect our data; see section 4.

the combined European and American sample but not significant in the regression that includes only European respondents. Cohen (2008, p. 3) notes that due to the nature of this crime rate and since no other crime-related variables are included, this result does not necessarily prove that violent crime has a negative impact; it rather suggests that "crime and social disarray in general" have a negative impact on well-being. Alesina et al. (2004) include the crime rate as a control variable (since it is correlated with their main variable of interest: inequality) and find no significant effect on happiness.

The paper by Di Tella et al. (2008) has a more specific focus on crime and well-being, investigating correlations between crime-related variables and well-being and different measures of positive and negative emotions (e.g., anger, worry, smiling) for a sample from the Gallup World Poll in 2006 and 2007 covering a large number of countries. Results (excluding Latin American countries) show that victimization is negatively related to well-being.

A study by Cohen (2008) combines previous research by looking at the regional crime rate, perceived neighborhood safety, and personal victimization in the U.S. over the period 1993–2004 (using the General Social Survey). The author concludes that crime rate and neighborhood safety have little impact on well-being. Victimization is only negative and significant for the specific case of victims of burglary, while the more general measure, victim of a violent crime, is not significant. Taking all these studies into consideration we can conclude that the relation between victimization and well-being is not straightforward. The literature agrees that the effect of victimization should be negative but the relation is not always significant and crime-related measures in general are not the most important contributors to explaining the variation in happiness.

Putnam (1993, p. 167) provides an appealing and intuitive definition of social capital: "features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated actions". Social capital is hypothesized to improve life satisfaction as it makes life easier to have more trust in others and more social interaction. A study by Stutzer and Lalive (2004), on the other hand, showed that social norms are not always a blessing: social work norms put pressure on the unemployed, reducing their life satisfaction. Bjørnskov (2003) looked at cross-country differences in social capital and their association with happiness. He used a social norm index that captures the three elements of social capital and found that it is positively related to happiness. To identify micro and macro measures that influence well-being at the individual and the national level, Helliwell (2003, 2006) included three separate measures of social capital and found that all three are significant and have a positive influence on well-being. Bjørnskov (2006) found, however, that only trust contributes significantly to subjective well-being: adding the other social capital indexes did not lead to significant improvement compared to a model including trust as the only social capital measure.

The association between health and subjective well-being is not obvious since health consists of different dimensions. Dolan et al. (2008) argues that physical health and well-being are positively associated and the causality is most likely to be from health to well-being. As health is considered to be one of the

domains of well-being, many studies include a (self-assessed) health measure in happiness regressions, for example, Ravallion and Lokshin (2001) and Cohen (2008). Both find a positive relation between health and subjective well-being. Clark and Oswald (1994) use *mental* well-being as a measure of happiness in relation to unemployment.

The studies discussed above typically use cross-section data and analyze the association between well-being and crime victimization and other variables, without considering potential causality or endogeneity issues. More recent work by Dustmann and Fasani (2011) and Cornaglia and Leigh (2011) is more ambitious and tries to isolate causal from non-causal effects. These studies use mental well-being/health instead of happiness but now in relation to crime measures. They argue that damage of crime can also be inflicted by non-victims, which may add significantly to the costs of crime. Cornaglia and Leigh (2011, p.20) acknowledge endogeneity of the crime variable(s) — coined as a sorting problem — as people "with mental distress symptoms are at the same time more likely to react more strongly to crime, or live in areas with higher crime rates". They account for this by estimating panel data models with fixed effects. They find that sorting is indeed a problem but nevertheless the impact of (area) crime on mental well-being remains significantly negative when sorting is taken into account. Our data do not allow us to use this identification strategy so that we cannot account for potential endogeneity of crime or other variables in our happiness regressions.

4. Data and descriptives

4.1. Data design

Our data set is based upon several surveys conducted in the Netherlands in June/July 2008 through CentERpanel (CP). CP consists of about 2000 households —representative of the Dutch population— aged 16 years and older, that are repeatedly invited to participate in web-based surveys.[3] The main source of information is a survey entitled "Incorrect Behavior in Everyday Life". See Douhou et al. (2011, 2012) for a detailed description of the complete survey. In this paper, one of our main interests is personal victimization experiences of our respondents, which are asked as follows:

- Have you been a victim of a serious crime in the past five years (i.e., burglary, holdup, violence, or something similar)?
- Have you been a victim of 'incorrect' behavior in the past five years?

If either question is answered "yes", then a follow-up question asks to rate the severity of the most serious crime on a scale from 1: very severe to 10: not severe. We use this information to construct four dummy variables that distinguish crime types (serious and small) and severity of the crime (severe if the score is 4 or lower and not severe if it is 5 or higher). The reason that we only ask about the past five years is to avoid a bias towards older respondents that have a higher probability of having been a victim in the past.

Most respondents in our small crime survey also participated in several other surveys in the same year. We exploit this to get more detailed background information. Questions on social trust and perceived norms of reciprocity, which we use to construct a trust index, are taken from the CP survey "Victims of (attempt to) Fraud" (Oudejans and Vis, 2008). These questions were phrased as follows:

- *trust1:* Would you say that most people can be trusted or that you cannot be too careful in dealing with people? Please answer on a scale from 1: you have to be careful to 11: most people can be trusted;
- *trust2:* Do you think that most people would try to take advantage of you if they got the chance, or would they try to be honest? Please answer on a scale from 1: most people would try to take advantage of me to 11: most people would try to be honest; and
- *trust3:* Would you say that most of the time people try to be helpful or that they are mostly just looking after themselves? Please answer on a scale from 1: people mostly just look after themselves to 11: people try to be helpful.

Health is one of the domains of (satisfaction with) life and is frequently included as a control variable in happiness regressions. From the DNB Household Survey (DHS), an annual survey also administered to respondents in the CP, we use a question on self-assessed health: "What is the general status of your health?" Our health index simply codes the five answers from 1: poor to 5: excellent, so that higher values indicate better self-assessed health. This survey is conducted between February and September 2008, with most questionnaires completed in April 2008.

The impact of crime-related issues consists not only of actual victimization but also of neighborhood problems, fear of victimization, etcetera (see Michalos and Zumbo, 2000). Since we do not have this information at the individual level, we use data on feelings of fear and the rate of victimization at a regional level. The aggregation is at the level of police regions; the Netherlands is divided into 25 police regions. A police region usually consists of one big city with its surrounding areas.[4] These data come from "Veiligheidsmonitor Rijk"" 2008 (VMR), obtained from Statistics Netherlands and conducted mid-2008.

The measure of perceived well-being comes from a CP survey conducted in November/December 2008 entitled "World Perceptions, Technology, and Environment" and is based upon the question: Generally speaking, would you say that you are ... 1: very unhappy ... 10: very happy? The respondents were shown a table with a ten point scale but only the extreme values 1 and 10 are provided with verbal labels.[5] All survey data have been collected in the same year. Since all surveys except the World Perceptions Survey are conducted within a period of just a few weeks, we assume that these time differences will not influence our

[3] Households that have no access to the Internet are provided the necessary means to participate in surveys.
[4] These regions are based on population density and crime rate; that is, higher crime rate and/or higher population density lead to a geographically smaller police region. Unfortunately, figures at a more detailed regional level were not available.
[5] The respondents did not have the possibility to answer "don't know" or "no answer".

conclusions: it seems highly unlikely that in the few weeks in between these surveys important shocks have taken place that may have affected response behavior. The World Perceptions survey was administered near the end of 2008. This time difference has the advantage that the concern that potential feedback mechanisms from subjective well-being to some of the explanatory variables would be mitigated. It does not, however, take away the concern that common unobserved factors drive well-being as well as, for example, victimization, so that endogeneity is still a potential problem (cf. Section 3).

4.2. Descriptive statistics

Descriptive statistics are shown in Table 1. This tells us that the majority of the respondents are male, finished at least a vocational education, have a partner, and do paid work. Not all respondents from the small crime survey participated in the other CP surveys, resulting in missing values for several measures gathered from other surveys, as can be seen in the third column of the table. The means in the table are very similar to those for the subsample without any missing values, suggesting that non-participation in one of the surveys does not lead to selection problems.

Table 1. Descriptive statistics

	Mean	Std	*N*
Non-binary			
age	51.33	15.84	1735
health	3.85	0.72	1441
hh_lincome	7.90	1.41	1735
size_hh	2.60	1.27	1735
social_norm	7.02	1.33	1734
trust1	7.34	2.06	1536
trust2	7.41	1.83	1520
trust3	6.94	1.93	1529
trust_index	21.69	5.04	1516
fear_rate	0.20	0.04	1736
vict_rate	0.25	0.04	1734
well-being	7.51	1.35	1736
Binary			
female	0.47		1735
edu_middle	0.39		1730
edu_high	0.54		1730
occup_pension	0.24		1735
occup_indep	0.04		1735
occup_nowork	0.24		1735
partner	0.78		1736
urban_high	0.41		1729
urban_middle	0.20		1729
victsmall_sev	0.11		1725

victsmall_notsev	0.15	1725
victserious_sev	0.06	1725
victserious_notsev	0.06	1725

Figure 1 shows the empirical distribution of our subjective well-being or "happiness" variable (Sumner, 1996). The average score is 7.51 (Table 1), which says that respondents are fairly happy on average. About 3.3% of the respondents report a happiness level of 3 or lower while the majority of the respondents are at the higher end of the scale: 58.9% reports a happiness level of 7 or higher.[6]

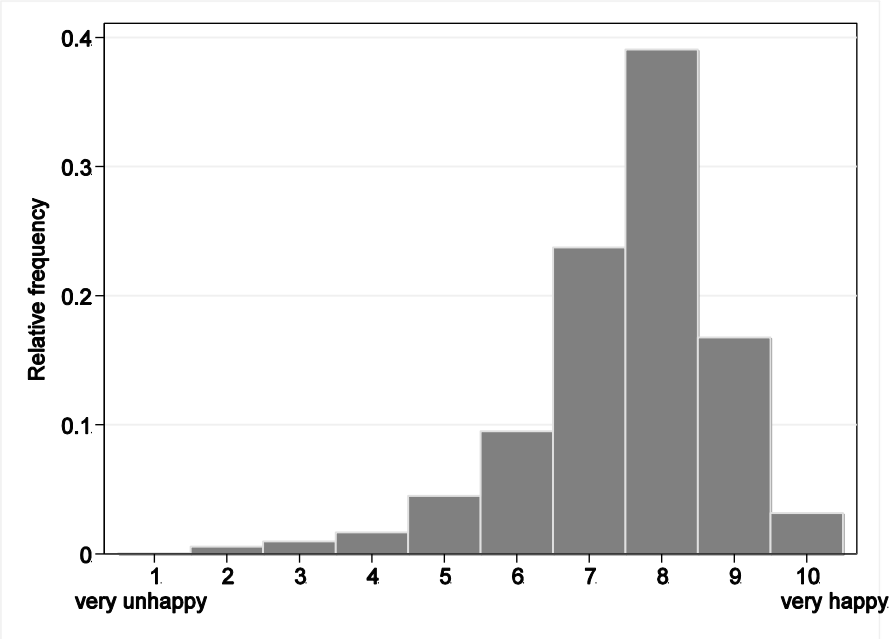


Figure 1. Subjective well-being.

Figure 2 shows that people who have been a victim of a serious crime in the past five years typically experienced a serious crime only once, while the empirical distribution of the number of small crimes is more evenly spread. This means that multiple victimization is a more common phenomenon for small crimes than for serious crimes, as expected. The number of unique victims (whether of a serious or of a small crime) is 618 and there are 96 respondents who report that they have been a victim of both a serious crime and a small crime in the past five years. If a respondent reported having been a victim of a crime (small or serious) in the past five years, then the perceived severity of this crime (or the worst of them in the case of multiple victimization) was asked using a ten-point scale (1: very severe, 10: not severe). The distribution of the reported answers is presented in Figure 3.

[6] The empirical results presented below did not change when combining the lowest categories.

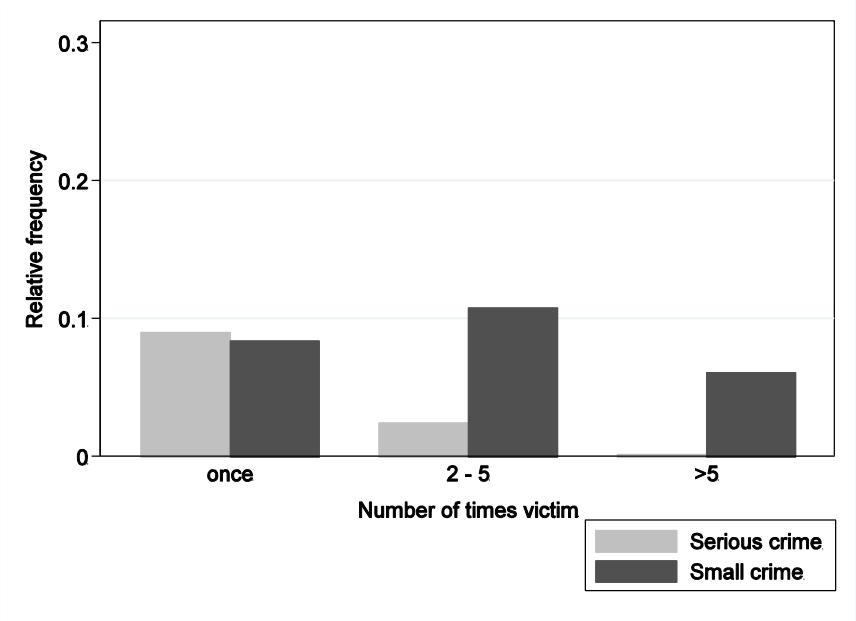
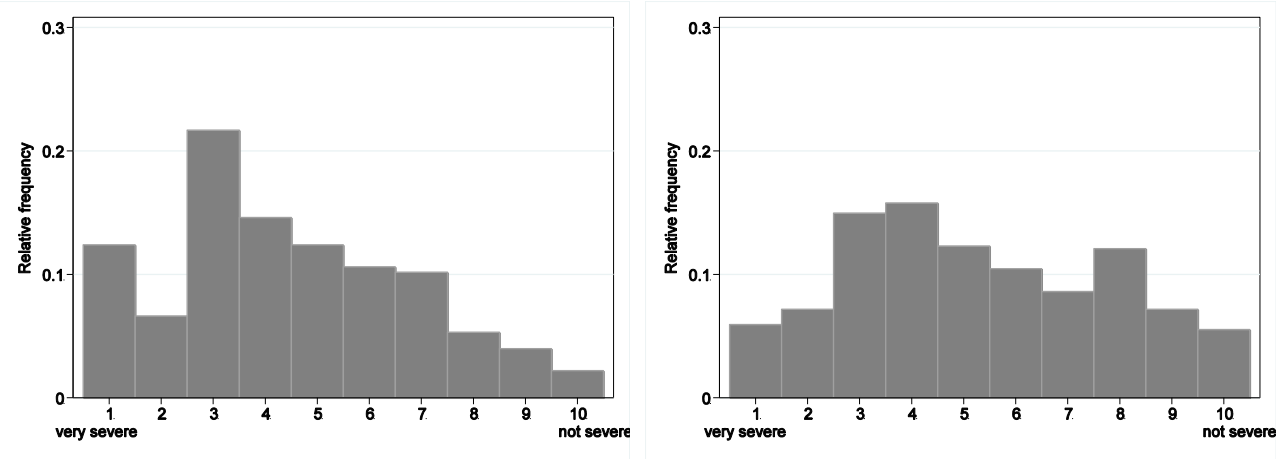


Figure 2. Relative frequency of victimization (victims only).



Serious crime Small crime

Figure 3. Severity of victimization.

It shows that some victims of a serious crime judge the crime to be very severe (1 or 2), while most respondents find the crime rather severe (the modal answer is 3), and only a few do not find the crime severe at all. For small crimes the distribution is more even, as one would expect. The average severity of a small crime is 5.3 (the median is 5), compared to 4.5 (median 4) for a serious crime. For our empirical analysis, we constructed four binary variables to distinguish between types of crime and severity of a crime type. A (serious or small) crime is considered severe if the perceived severity (of the worst serious or small crime in the past five years) is rated 4 or lower and not severe if the severity is rated 5 or higher. The reference category are respondents who were not a victim of any serious or small crime. For example, the variable *victsmall_sev* is 1 if a victim of a small crime gives the crime a rating of 4 or lower and 0 otherwise.

In order to provide more insight into the raw data, we present the number of victimized respondents for different groups in Table 2. Men and younger people (aged below 55) are more likely to be a crime victim. This is a common result in the empirical literature on crime victimization: the most fearful groups of society (women and elderly) are the least victimized. When we only look at victimization of a small crime the difference between men and women is very small. Furthermore, the elderly are much less likely to report that they have been the victim of a small crime.

Table 2. Victims of crime by gender and age*

	Female	Male	< 55 years	55 + years
victim_small	24.9	25.6	27.8	21.9
victim_serious	10.9	12.4	12.3	11.0
victim	31.0	32.9	34.5	28.7

Remarks. * — values are percentage of victims within a subgroup.

In Table 3 we present mean scores for well-being of victims and non-victims by gender. Consistent with other studies we find that non-victims report a higher subjective well-being than victims. In addition, well-being for victims of a serious crime is lower than for victims of small crime. The difference in mean scores for women is less obvious: it looks like it does not matter much whether women have been victimized or not. The male group is not the same in this respect: male victims report clearly a lower well-being than male non-victims. Despite the absolute differences in well-being we find that none of the mean differences are significant. This shows us that the victimization–subjective well-being relation is not expected to be strong. This does not discard our main interest as the focal point of our research is not on victimization.

Table 3. Victim and subjective well-being mean scores

	Mean	Std	*N*
victim	7.46	1.34	556
non-victim	7.53	1.36	1169
victim_serious	7.41	1.47	207
non-victim_serious	7.52	1.34	1518
victim_small	7.45	1.29	441
non-victim_small	7.53	1.38	1284
female victim	7.52	1.34	250
female non-victim	7.53	1.30	556
male victim	7.42	1.34	306
male non-victim	7.55	1.41	612

How much trust the respondent has in other people can be important for actions and beliefs in general (Deutsch, 1958) as well as for subjective well-being, since more intense social linkages are expected to make people happier (see Bjørnskov, 2003, 2006 and Helliwell, 2003, 2006). The variable *trust_index* is constructed as the sum of three variables that measure several aspects of a person's trust, each on a scale from

1 to 11 (a higher value means more trust in others), so that *trust_index* ranges from 3: very low trust to 33: maximum trust level. Figure 4, with a mode of 24 and a mean of 21.7, shows that respondents in general tend to have trust in others.

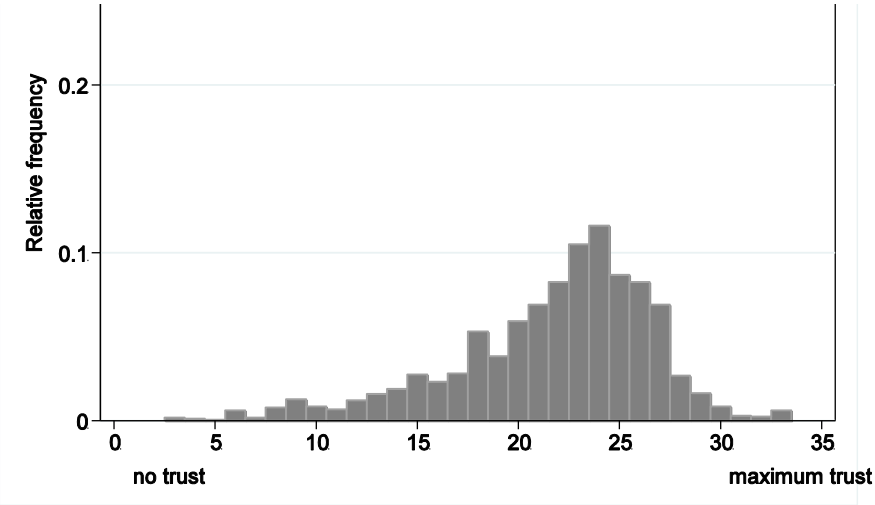


Figure 4. Trust_index.

See Table A1 in Appendix for details on the three questions. We present the distribution of these three separate trust measures in Figure 5, which shows that there are no large differences between the three distributions (see also Table 1).

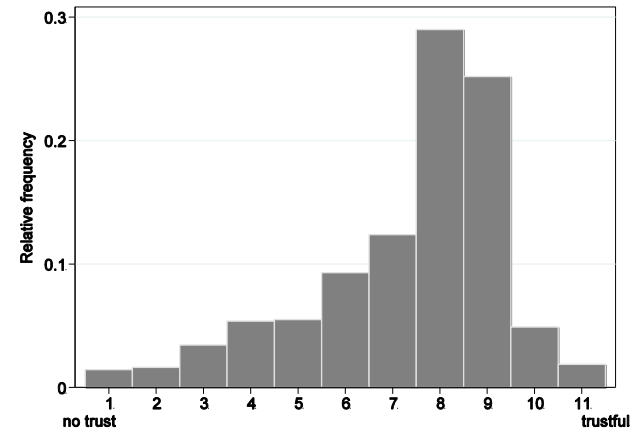
We constructed a social norm index as the average of the responses on severity (on a scale from 1: very severe to 10: not severe) of a list of 18 offenses that differ in the level of damage caused (from stealing a pen to damaging a car and not informing the owner); see Table 2 in Douhou et al. (2011) for the 18 questions and the mean answers to all of them. To simplify interpretation, our index is defined as 11 minus the mean of the 18 answers, so that a higher value reflects a higher social norm; in the sense of finding crimes less justifiable or more severe. The overall mean of our index is 7.02.

5. Regression results

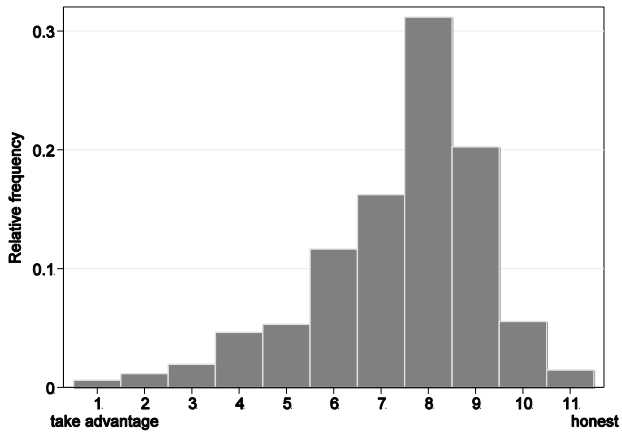
5.1. Model

Standard economic theory assumes that individual preferences can be described with a utility function. Following Powdthavee (2005) we assume there exists a utility function for each respondent that describes subjective well-being and has as inputs socio-economic and demographic characteristics, including age, gender, household size, marital status, trust, and past victimization. We will also interact some characteristics to study the effect of victimization for socio-demographic subgroups (defined by age and gender). We obviously cannot observe true well-being, only reported well-being. The literature on psychology shows convincing evidence that reported well-being is correlated with physical reactions that are in turn related to true well-being (see Di Tella, MacCulloch, 2008). According to Frey and Stutzer (2002, p. 405) "it is a sensible tradition in economics to rely on the judgement of the persons involved". Hence, we

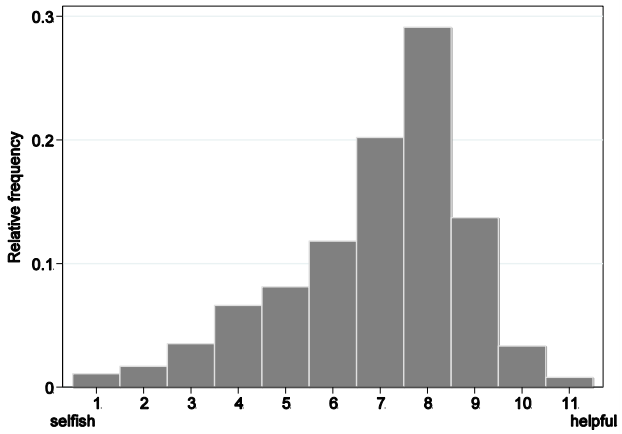
assume that respondents can communicate a level of well-being that is close to their true well-being.



(a) Trust1



(b) Trust2



(c) Trust3

Figure 5. Histograms of trust variables.

Since the response scale of subjective well-being is discrete and ordered (ranging from 1: very unhappy to 10: very happy), we use an ordered probit model.[7] This model describes the reported evaluation as the category containing the value of an unobserved (latent) continuous variable y_i^*, which is driven by a vector of explanatory variables x_i and an error term ε_i:

$$
\begin{aligned}
& y_i^* = x_i^{'}\beta + \varepsilon_i \,, \\
& \varepsilon_i : \;\; N(0,1) \,, \;\; \text{independent of} \;\; x_i \,, \\
& y_i = j \quad \text{if} \quad \alpha_{j-1} < y_i^* \le \alpha_j \,,
\end{aligned}
\tag{1}
$$

where $i = 1,\ldots,N$ denotes the respondent, and $j = 1,\ldots,10$ are the possible values that y_i can have. In the

[7] An ordered logit model leads to very similar results.

next subsections we will discuss, in turn, the main variables we have in mind for the mechanism discussed in Section 2.

5.2. Victimization

To show how victimization varies with individual characteristics, Table 4 presents regression results with the four personal victimization dummies as dependent variables and some basic respondent and area characteristics as regressors.[8] Not many variables are statistically significant. Living in a highly urbanized area significantly increases the probability of being victimized compared to living in a non-urbanized area in three out of four cases. People living in an area with an intermediate urbanization are more likely to be the victim of a severe serious crime but less likely to be the victim of another type of crime than those living in big cities. Respondents with their own (small) business (*occup_indep* = 1) are significantly more likely to be the victim of a severe (small or serious) crime than employees. This may be because small businesses are vulnerable to burglaries and incorrect behavior by customers. Non-workers less often than employees report to be the victim of a non-severe small crime. We find no relation between living in an area that has a high rate of victimization and/or fear of crime and actual victimization at the individual level. This is not so surprising considering that the local crime-related measures are defined for a relatively broad region, which makes it difficult to find a direct link with personal victimization.

Table 4. Probit regression of personal victimization

	victsmall				*victserious*			
	Severe		Not severe		Severe		Not severe	
hh_linc	0.136	(0.091)	0.066	(0.082)	–0.145	(0.097)	0.087	(0.112)
age	0.061***	(0.019)	–0.004	(0.016)	0.021	(0.020)	0.006	(0.021)
age ^{2}	–0.001***	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
female	–0.063	(0.085)	0.045	(0.078)	–0.085	(0.100)	–0.141	(0.107)
edu_middle	–0.067	(0.181)	–0.230	(0.162)	–0.037	(0.204)	–0.435**	(0.196)
edu_high	0.032	(0.179)	–0.072	(0.159)	–0.026	(0.204)	–0.254	(0.192)
urban_high	0.194**	(0.098)	0.202**	(0.091)	0.251**	(0.119)	0.023	(0.125)
urban_middle	0.126	(0.110)	0.075	(0.104)	0.301**	(0.130)	0.184	(0.135)
occup_pension	–0.023	(0.166)	–0.195	(0.159)	–0.275	(0.201)	–0.264	(0.216)
occup_indep	0.283*	(0.169)	–0.027	(0.173)	0.503***	(0.183)	–0.018	(0.231)
occup_nowork	0.040	(0.115)	–0.249**	(0.110)	0.057	(0.133)	0.083	(0.143)
size_hh	–0.008	(0.040)	–0.046	(0.037)	0.024	(0.048)	–0.050	(0.050)
partner	–0.136	(0.114)	0.088	(0.107)	–0.224*	(0.130)	0.000	(0.140)
vict_rate	0.165	(1.798)	1.574	(1.695)	0.677	(2.108)	3.439	(2.144)
fear_rate	–0.536	(1.802)	–2.110	(1.681)	0.029	(2.136)	–0.721	(2.180)
constant	–3.619***	(0.881)	–1.203	(0.787)	–1.115	(0.960)	–2.665**	(1.074)
N	1820		1820		1820		1820	

[8] We also ran a multivariate probit regression and found hardly any differences with the results in Table 4.

pseudo R^2	0.025	0.026	0.038	0.032

Remarks. *** = $\{p < 0.01\}$; ** = $\{0.01 \leq p < 0.05\}$; * = $\{0.05 \leq p < 0.10\}$. Standard errors in parentheses. We included a dummy for zero income.

5.3. Trust, health, and social norms

Socio-economic variables like gender and income are widely considered as control variables in the well-being literature. We introduce trust, health, and social norms as additional controls, but first analyze whether they are related to our crime measures. This is important since if they are, crime may affect well-being through these measures or directly. Personal victimization might have an effect on a person's trust in others and their judgement of other crimes. Existing studies show, in addition, that victimization has a negative influence on one's perceived physical health (see Britt, 2001 and Koss et al., 1990, 1991). Research on the relation between mental health and victimization (see Cornaglia and Leigh, 2011, and Dustmann and Fasani, 2011) comes to the same conclusion: victimization is detrimental to one's (mental) health.[9] This suggests that personal victimization can have an indirect relation with happiness via self-assessed health, trust, and social norms.

In Table 5 we present regression results with trust, health, and social norms as dependent variables. We find that females, older persons, higher educated respondents, and people with a high income have more trust in others compared to their counterparts (males, younger persons, etcetera). Females and older age groups are also found to have higher social norms, in the sense that they find small crimes less justifiable than males and younger age groups. The gender difference is consistent with a fair part of the literature on ethical decision-making, but the results for age in the existing literature are ambiguous (O'Fallon and Butterfield, 2005). As expected, richer, higher educated, and younger people give themselves a better health rating, while people without full-time work ($occup_nowork = 1$) have lower self-assessed health.

Table 5. Regressions with trust, social norms, and health as dependent variables

	trust_index		*social_norm*		*health*		*Health*	
hh_linc	1.319***	(0.286)	0.015	(0.063)	0.278***	(0.068)	0.250***	(0.068)
age	0.127**	(0.051)	0.034***	(0.012)	–0.023*	(0.012)	–0.030**	(0.012)
age^2	–0.001*	(0.001)	0.000	(0.000)	–0.000	(0.000)	0.000	(0.000)
female	1.249***	(0.264)	0.324***	(0.061)	–0.076	(0.064)	–0.132**	(0.065)
edu_middle	0.722	(0.543)	0.111	(0.124)	0.324***	(0.123)	0.291**	(0.123)
edu_high	1.677***	(0.541)	0.141	(0.124)	0.356***	(0.123)	0.291**	(0.124)
urban_high	0.211	(0.304)	–0.063	(0.071)	–0.057	(0.073)	–0.050	(0.074)
urban_middle	–0.664**	(0.335)	–0.071	(0.079)	–0.041	(0.081)	–0.013	(0.081)
occup_pension	0.912*	(0.500)	0.032	(0.116)	–0.076	(0.118)	–0.108	(0.119)
occup_indep	0.669	(0.631)	–0.428***	(0.139)	–0.101	(0.149)	–0.077	(0.151)

[9] Admittedly, the meaning of mental health is ambiguous as it can be related to physical health (people that are physically ill are more likely to be depressed and vice versa) and subjective well-being (feeling bad is expected to make less happy and vice versa).

occup_nowork	–0.387	(0.352)	0.028	(0.083)	–0.368***	(0.085)	–0.362***	(0.086)
size_hh	0.168	(0.123)	0.075**	(0.029)	0.060**	(0.030)	0.052*	(0.030)
victsmall_sev	–0.879**	(0.411)	0.202**	(0.095)	–0.223**	(0.099)	–0.231**	(0.100)
victsmall_notsev	0.238	(0.356)	–0.251***	(0.083)	–0.081	(0.086)	–0.077	(0.087)
victserious_sev	–0.963*	(0.529)	0.047	(0.122)	–0.156	(0.125)	–0.133	(0.126)
victserious_notsev	0.195	(0.539)	–0.216*	(0.127)	0.136	(0.132)	0.163	(0.133)
partner	–0.709**	(0.351)	–0.196**	(0.082)	0.025	(0.084)	0.057	(0.084)
vict_rate	0.070	(5.651)	0.564	(1.315)	–0.038	(1.374)	0.021	(1.380)
fear_rate	–1.957	(5.540)	–1.369	(1.302)	–0.194	(1.364)	–0.219	(1.369)
trust_index							0.032***	(0.006)
social_norm							0.067***	(0.024)
constant	6.178**	(2.702)	5.041***	(0.603)				
N	1576		1820		1510		1510	
(pseudo) R^2	0.074		0.176		0.051		0.062	

Remarks. *** = $\{p < 0.01\}$; ** = $\{0.01 \leq p < 0.05\}$; * = $\{0.05 \leq p < 0.10\}$. Standard errors in parentheses. We included a dummy for zero income. Ordered probit is used for health and OLS for trust and social norms.

The last column of Table 5 shows that social trust and health are positively associated at the individual level, controlling for socio-economic variables. This is in line with the existing literature (Barefoot et al., 1998; Poortinga, 2006; Rose, 2000). As emphasized before, we cannot claim that this reflects a causal effect in a given direction: Poortinga (2006, p. 301) notes that poor health may lead to social exclusion and lower trust, but Rose (2000) finds an effect of social trust on health.

Being the victim of a severe small or serious crime is negatively related to trust in others and health, while a positive association with social norms, i.e., victimization seems to make the respondent *more* dismissive of crimes. On the other hand, being the victim of a not so severe small crime makes one's judgement of small crimes milder or, in other words, it lowers social norms. Being a victim of a serious crime has no significant effect on health, while a not severe crime victimization is negatively related to social norms.

5.4. Happiness

We distinguish two models for subjective well-being: a baseline model and an extended specification.[10] The results are presented in Table 6. The baseline model shows a marginally significant negative association between subjective well-being and being the victim of a not severe small crime. The other three victimization dummies are insignificant. The control variables that have a significant relationship with subjective well-being are similar to what is found in the happiness literature: women are in general happier than men with the same socio-economic characteristics and having a partner increases one's happiness. Additional household members are also significantly associated with more happiness but this

[10] Dolan et al. (2008) criticize studies on subjective well-being for including a single specification only and not showing what the impact is when other or more controls are added. With this set-up we try to meet this criticism.

effect is much smaller than that of having a partner. Higher household income is also associated with more happiness.[11] Retired people have more time for leisure which can explain why they are happier: the effect of *occup_pension* is positive and significant (the reference group consists of people on a payroll).

The second specification extends the basic model with indexes for trust, social norms, self-assessed health, and regional crime-related measures. In the extended specification the explained variance (pseudo R^2) increases from roughly 0.03 to 0.07, which is close to the results found in related studies. The results for the socio-demographic characteristics in the extended model are generally comparable to those in the basic model, though gender and urbanization that were significant in the basic model are no longer significant. Health and happiness are found to be strongly positively related, which is in line with expectations and the existing literature.

Table 6. Ordered probit regression: basic and extended model for total sample

	Basic		Extended	
hh_linc	0.249***	(0.055)	0.153***	(0.056)
age	–0.015	(0.011)	–0.013	(0.011)
age^2	0.000	(0.000)	0.000	(0.000)
female	0.108**	(0.054)	0.057	(0.055)
edu_middle	0.071	(0.109)	–0.059	(0.110)
edu_high	0.076	(0.109)	–0.099	(0.111)
urban_high	–0.006	(0.058)	0.018	(0.063)
urban_middle	–0.118*	(0.069)	–0.091	(0.070)
occup_pension	0.212**	(0.102)	0.231**	(0.103)
occup_indep	0.101	(0.125)	0.099	(0.126)
occup_nowork	–0.109	(0.072)	0.003	(0.073)
size_hh	0.061**	(0.026)	0.046*	(0.026)
victsmall_sev	–0.065	(0.084)	0.025	(0.085)
victsmall_notsev	–0.136*	(0.073)	–0.127*	(0.074)
victserious_sev	0.060	(0.107)	0.130	(0.108)
victserious_notsev	–0.018	(0.110)	–0.046	(0.111)
partner	0.439***	(0.073)	0.491***	(0.074)
vict_rate			–3.276***	(1.170)
fear_rate			3.145***	(1.164)
health			0.483***	(0.041)
trust_index			0.046***	(0.006)
social_norm			0.044**	(0.021)

[11] Easterlin (1974) showed that happiness and income are positively correlated but that over time, as average income levels increased, happiness did not increase accordingly. This result, referred to as the Easterlin paradox, stirred a lot of research on how to measure income to capture an income effect in a well-being regression. Since our data are of cross sectional nature we will keep matters simple and include the (log of) absolute income level to account for the fact that people with higher income have more means to satisfy their needs and are therefore expected to be happier. In addition, gross monthly income is censored at 10000 euros to account for outliers; since zero incomes may be misreported (and thus reflect missing values) we also include a dummy variable for zero reported income (not reported in the table).

N	1713	1711
pseudo R^2	0.026	0.068

Remarks. $*** = \{p < 0.01\}$; $** = \{0.01 \leq p < 0.05\}$; $* = \{0.05 \leq p < 0.10\}$. Standard errors in parentheses. We included dummies for missing observations for *health* and *trust_index* and a dummy for zero income.

We also find a strong and significant positive link between our broad index of trust and subjective well-being.[12] Another component of social capital, the social norms index, also positively and significantly contributes to well-being. This is consistent with the empirical literature on social capital.

We use the regional rate of victimization[13] and the rate of fear of crime in the respondent's region of residence to capture area-specific relations between crime and well-being. The rate of victimization is significant and has the expected sign: respondents living in an area with a high victimization rate are less happy than others, *ceteris paribus*. On the other hand, we find a strong and *positive* relation between *fear_rate* and well-being. This result seems counterintuitive. Cohen (2008) offers an explanation for this result: people who live in unsafe areas are compensated for the higher risk of victimization via lower costs of living or adapt their behavior, which might result in a higher well-being compared to people who live in areas considered safer.

Regarding actual victimization we find similar results as for the baseline model: victims of a not so severe small crime have a lower well-being, although this association is only significant at a 10% level. The other victimization dummies remain insignificant. The coefficients of victimization in the extended model reflect the direct relation between personal victimization and well-being only (keeping trust, social norms, and health constant), while victimization in the basic model measures the sum of the direct and indirect relation between victimization and well-being. As trust, health, and social norms are associated with victimization (see Table 5) and well-being (see Table 6), we expected an indirect relation to exist. Apparently, this is not strong enough to lead to a substantial difference between the coefficients on victimization in the two models.[14]

The relations we find between personal victimization and well-being are not as strong as we expected. This is in line with Hanson et al. (2010, p. 193) who conclude in a literature review on the (functional) impact of victimization on subjective well-being that the findings are 'not robust'. There can be several explanations for this. First, endogeneity as a result of unobserved individual characteristics influence the results. Second, the way personal victimization is measured: the victimization window in the survey is

[12] We also looked at a specification where we included the three trust-type of variables separately (instead of combining them into one index) and found that the effect of *trust2* (honesty by others) is slightly larger than that of *trust1* and *trust3*. However, a likelihood ratio test did not reject the assumption that the three trust variables have the same coefficient, which is what we assumed in the model presented here.

[13] This measure includes victimization from violent and property crimes and from vandalism; we did a similar analysis including separate victimization rates for each crime type and find no significant results.

[14] Since victimization is not correlated with *fear_rate* and *vict_rate* (see Table 4) we can safely say that the changes to the coefficients of victimization in Table 6 when moving from the basic to the extended model reflect possible indirect

five years, which may be considered too long to capture a (robust) association with subjective well-being. Moreover, other measurement errors, such as the definition of the crime types and telescoping, may be at work here. Despite this we find very convincing results for the association of happiness with health, trust, and social norms.

5.5. Results by age and gender

The majority of the victims in our sample are males younger than 55. Female and elderly groups are known for displaying the highest fear of victimization although crime statistics show that they have the lowest probability of being victimized. This suggests that the role of victimization may differ for men and women and for younger and older respondents. We therefore also estimated the models separately by gender and age group (younger than 55 versus 55 years or older). The results are presented in Tables 7 and 8. Again we distinguish a baseline and an extended specification. The results by age group in Table 7 show that victimization is negatively related to subjective well-being for older respondent in both specifications. In addition, retired people are more satisfied than people (of the same age) who did not retire yet. Looking at Table 8 it is interesting to see that the positive association between income and the happiness only applies to men. The effect of severe small crimes is positive and marginally significant for women in the extended model while it is negative for men. Could this indicate adaptive behavior after a negative experience by women and not by men? The association between not working (which includes students, unemployed, incapacitated for work, or otherwise) and happiness is negative for women in the basic specification. This effect is comparable to the well-known negative effect of unemployment (see Clark and Oswald, 1994, and Winkelmann and Winkelmann, 1998), although our measure of non-employment is broader than (involuntary) unemployment.[15] Higher social norms are significantly positively related to the well-being of men but insignificant for women.

Table 7. Ordered probit regression: basic and extended model by *age*

	Basic				Extended			
	< 55 years		55+ years		< 55 years		55+ years	
hh_linc	0.270***	(0.082)	0.237***	(0.077)	0.163*	(0.084)	0.147*	(0.079)
age	–0.031	(0.029)	–0.005	(0.090)	–0.020	(0.029)	–0.020	(0.091)
age ^{2}	0.000	(0.000)	0.000	(0.001)	0.000	(0.000)	0.000	(0.001)
female	0.197***	(0.072)	–0.026	(0.086)	0.178**	(0.074)	–0.155*	(0.089)
edu_middle	0.198	(0.163)	–0.068	(0.152)	0.049	(0.165)	–0.219	(0.154)
edu_high	0.183	(0.167)	–0.022	(0.154)	0.015	(0.169)	–0.281*	(0.157)
urban_high	0.017	(0.082)	0.007	(0.085)	–0.006	(0.087)	0.064	(0.093)
urban_middle	–0.177*	(0.095)	–0.030	(0.104)	–0.182*	(0.095)	0.026	(0.105)

relations.

[15] Occupational status and students or others in the "non-employment" group can have a small job. Still, Bardasi and Francesconi (2004) show that seasonal or casual work has a negative effect on well-being.

occup_pension			0.166	(0.136)			0.228*	(0.138)
occup_indep	0.084	(0.154)	0.088	(0.220)	0.046	(0.157)	0.200	(0.222)
occup_nowork	–0.232**	(0.098)	–0.052	(0.126)	–0.076	(0.101)	0.140	(0.128)
size_hh	0.113***	(0.030)	–0.078	(0.070)	0.076**	(0.031)	0.011	(0.071)
victsmall_sev	–0.132	(0.115)	–0.024	(0.126)	–0.060	(0.116)	0.097	(0.127)
victsmall_notsev	–0.086	(0.092)	–0.206*	(0.122)	–0.090	(0.093)	–0.217*	(0.124)
victserious_sev	0.054	(0.141)	0.106	(0.167)	0.102	(0.142)	0.184	(0.168)
victserious_notsev	0.073	(0.145)	–0.122	(0.170)	0.048	(0.146)	–0.155	(0.174)
partner	0.455***	(0.103)	0.505***	(0.120)	0.575***	(0.106)	0.389***	(0.122)
vict_rate					–3.099*	(1.630)	–3.369*	(1.717)
fear_rate					4.428***	(1.576)	1.820	(1.765)
health					0.507***	(0.058)	0.471***	(0.061)
trust_index					0.039***	(0.008)	0.056***	(0.008)
social_norm					0.038	(0.028)	0.043	(0.032)
N	936		777		936		775	
pseudo R^2	0.038		0.022		0.076		0.072	

Remarks. *** = $\{p < 0.01\}$; ** = $\{0.01 \leq p < 0.05\}$; * = $\{0.05 \leq p < 0.10\}$. Standard errors in parentheses. We included dummies for missing observations for *health* and *trust_index* and a dummy for zero income.

Table 8. Ordered probit regression: basic and extended model by *gender*

	Basic				Extended			
	women		men		women		men	
hh_linc	0.109	(0.078)	0.370***	(0.079)	0.029	(0.079)	0.262***	(0.080)
age	–0.025	(0.016)	–0.006	(0.015)	–0.021	(0.016)	–0.003	(0.015)
age ^{2}	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
edu_middle	0.013	(0.157)	0.108	(0.155)	–0.255	(0.160)	0.098	(0.156)
edu_high	–0.018	(0.161)	0.126	(0.153)	–0.279*	(0.164)	0.012	(0.155)
urban_high	–0.018	(0.085)	0.003	(0.081)	0.053	(0.091)	–0.018	(0.087)
urban_middle	–0.096	(0.101)	–0.147	(0.097)	–0.090	(0.101)	–0.099	(0.098)
occup_pension	–0.017	(0.158)	0.322**	(0.139)	0.082	(0.160)	0.274*	(0.141)
occup_indep	0.149	(0.197)	0.065	(0.162)	0.130	(0.200)	0.056	(0.164)
occup_nowork	–0.193**	(0.095)	–0.096	(0.129)	–0.070	(0.097)	0.101	(0.132)
size_hh	0.097***	(0.037)	0.037	(0.037)	0.076**	(0.038)	0.025	(0.037)
victsmall_sev	0.123	(0.128)	–0.209*	(0.113)	0.246*	(0.129)	–0.130	(0.115)
victsmall_notsev	–0.142	(0.107)	–0.111	(0.101)	–0.171	(0.108)	–0.071	(0.102)
victserious_sev	0.135	(0.159)	0.038	(0.146)	0.303*	(0.160)	0.020	(0.148)
victserious_notsev	–0.041	(0.167)	–0.024	(0.147)	–0.069	(0.171)	–0.036	(0.148)
partner	0.507***	(0.102)	0.368***	(0.109)	0.553***	(0.103)	0.434***	(0.110)
vict_rate					–4.295**	(1.784)	–2.590*	(1.566)
fear_rate					3.626**	(1.780)	2.974*	(1.556)
health					0.507***	(0.063)	0.490***	(0.057)
trust_index					0.045***	(0.009)	0.049***	(0.008)
social_norm					0.020	(0.030)	0.070**	(0.029)
N	801		912		800		911	

pseudo R^2	0.030	0.028	0.072	0.073

Remarks. *** = $\{p < 0.01\}$; ** = $\{0.01 \leq p < 0.05\}$; * = $\{0.05 \leq p < 0.10\}$. Standard errors in parentheses. We included dummies for missing observations for *health* and *trust_index* and a dummy for zero income.

It can be concluded that the relation between personal victimization and well-being is weak for all groups. In the extended specification, we find some negative effects that are marginally significant, but almost as many marginally significant counterintuitive positive effects. Living in a region with a high rate of victimization is significantly negatively associated with subjective well-being for all subgroups, and the association is particularly strong for women. On the other hand, we find a positive effect of the regional fear of crime rate which is particularly strong for younger individuals. The effects of trust and health are significantly positive for all groups.

5.6. Some sensitivity checks

Up to now we modeled our respondents as independent from each other while they are actually part of a household where interdependencies regarding well-being may exist (Winkelmann, 2005). A first attempt to correct for this is presented in Table 9 by means of clustered standard errors within a household. We see that this slightly elevates standard errors but no real differences appear when we compare the results with Table 6.

Table 9. Ordered probit regression: basic and extended model using clustered errors

	Basic		Extended	
hh_linc	0.249***	(0.055)	0.153***	(0.056)
age	–0.015	(0.011)	–0.013	(0.011)
age^2	0.000	(0.000)	0.000	(0.000)
female	0.108**	(0.049)	0.057	(0.051)
edu_middle	0.071	(0.123)	–0.059	(0.122)
edu_high	0.076	(0.122)	–0.099	(0.120)
urban_high	–0.006	(0.066)	0.018	(0.070)
urban_middle	–0.118	(0.080)	–0.091	(0.078)
occup_pension	0.212*	(0.109)	0.231**	(0.109)
occup_indep	0.101	(0.113)	0.099	(0.117)
occup_nowork	–0.109	(0.074)	0.003	(0.073)
size_hh	0.061**	(0.029)	0.046	(0.029)
victsmall_sev	–0.065	(0.087)	0.025	(0.091)
victsmall_notsev	–0.136*	(0.071)	–0.127*	(0.070)
victserious_sev	0.060	(0.121)	0.130	(0.121)
victserious_notsev	–0.018	(0.126)	–0.046	(0.123)
partner	0.439***	(0.074)	0.491***	(0.077)
vict_rate			–3.276**	(1.323)
fear_rate			3.145**	(1.337)

health			0.483***	(0.049)
trust_index			0.046***	(0.007)
social_norm			0.044*	(0.024)
N	1713		1711	
pseudo R^2	0.026		0.068	

Remarks. *** = $\{p < 0.01\}$; ** = $\{0.01 \leq p < 0.05\}$; * = $\{0.05 \leq p < 0.10\}$. Standard errors in parentheses. We included dummies for missing observations for *health* and *trust_index* and a dummy for zero income.

Another way to correct for household interdependencies is to explicitly model it by using an ordered probit model with household specific random effects. The results in Table 10 show that the personal victimization variables are not significant anymore while all other results are similar to what we have found before.

Table 10. Random effects ordered probit regression: basic and extended model

	Basic		Extended	
hh_linc	0.335***	(0.081)	0.186**	(0.078)
age	–0.027*	(0.014)	–0.021	(0.013)
age ^{2}	0.000	(0.000)	0.000	(0.000)
female	0.161**	(0.065)	0.084	(0.065)
edu_middle	0.022	(0.138)	–0.125	(0.136)
edu_high	0.020	(0.139)	–0.174	(0.137)
urban_high	–0.020	(0.086)	0.015	(0.088)
urban_middle	–0.136	(0.103)	–0.098	(0.099)
occup_pension	0.285**	(0.133)	0.284**	(0.130)
occup_indep	0.159	(0.162)	0.158	(0.159)
occup_nowork	–0.122	(0.092)	–0.004	(0.091)
size_hh	0.084**	(0.038)	0.067*	(0.037)
victsmall_sev	–0.034	(0.111)	0.049	(0.108)
victsmall_notsev	–0.136	(0.095)	–0.136	(0.093)
victserious_sev	0.026	(0.141)	0.097	(0.138)
victserious_notsev	0.043	(0.146)	–0.010	(0.142)
partner	0.580***	(0.101)	0.626***	(0.099)
vict_rate			–4.003**	(1.636)
fear_rate			3.547**	(1.642)
health			0.562***	(0.053)
trust_index			0.062***	(0.008)
social_norm			0.057**	(0.027)
N	1713		1711	
ρ	0.450		0.400	

Remarks. *** = $\{p < 0.01\}$; ** = $\{0.01 \leq p < 0.05\}$; * = $\{0.05 \leq p < 0.10\}$. Standard errors in parentheses. We included dummies for missing observations for *health* and *trust_index* and a dummy for zero income.

In Table 11 we include measures of victimization that discriminate between single and multiple

victimization (using the information on the number of small or serious crimes that respondents were a victim of in the last five years; see Figure 2). Higher values indicate that a person has been more often a victim of a certain type of crime. Multiple victimization of a not so severe small crime has a negative but not very strong and marginally significant relation with well-being; the other variables are insignificant.

Table 11. Ordered probit regression: basic and extended model including multiple victimization

	Basic		Extended	
hh_linc	0.250***	(0.055)	0.152***	(0.056)
age	–0.015	(0.011)	–0.013	(0.011)
age^2	0.000	(0.000)	0.000	(0.000)
female	0.108**	(0.054)	0.056	(0.055)
edu_middle	0.076	(0.109)	–0.0.053	(0.110)
edu_high	0.081	(0.109)	–0.094	(0.111)
urban_high	–0.004	(0.058)	0.019	(0.063)
urban_middle	–0.116*	(0.069)	–0.089	(0.070)
occup_pension	0.211**	(0.102)	0.232**	(0.103)
occup_indep	0.104	(0.125)	0.099	(0.126)
occup_nowork	–0.108	(0.072)	0.005	(0.073)
size_hh	0.062**	(0.026)	0.046*	(0.026)
mvictsmall_sev	–0.031	(0.041)	0.015	(0.042)
mvictsmall_notsev	–0.065*	(0.034)	–0.057*	(0.034)
mvictserious_sev	0.013	(0.082)	0.071	(0.082)
mvictserious_notsev	0.010	(0.078)	–0.004	(0.079)
partner	0.436***	(0.073)	0.488***	(0.074)
vict_rate			–3.280***	(1.169)
fear_rate			3.155***	(1.164)
health			0.481***	(0.041)
trust_index			0.046***	(0.006)
social_norm			0.044**	(0.021)
N	1713		1711	
pseudo R^2	0.026		0.068	

Remarks. $*** = \{p < 0.01\}$; $** = \{0.01 \leq p < 0.05\}$; $* = \{0.05 \leq p < 0.10\}$. Standard errors in parentheses. We included dummies for missing observations for *health* and *trust_index* and a dummy for zero income.

Finally, we consider some dynamic effects. Due to the cross-section nature of our data, we cannot consider changes in all (left hand side or right hand side) variables and follow a fixed effects approach like Cornaglia and Leigh (2011). But we are able to use values of the regional variables two years earlier. Moreover, we also know whether people still live at the same address as two years earlier. In our sample, about 8% of the respondents have moved between 2006 and 2008. First, in order to see whether for movers the association with the regional crime rate is different than for non-movers, we included a dummy for movers as well as an interaction term between a dummy for moving in the last two years and the rate of victimization in the area of residence. Both variables are insignificant, and including them hardly changes the

other coefficients — see the left hand columns in Table 12.

Table 12. Ordered probit regression: robustness checks with dynamics

	Movers and non-movers		The change in regional victimization	
hh_linc	0.154***	(0.056)	0.169***	(0.057)
age	–0.012	(0.011)	–0.017	(0.011)
age^2	0.000	(0.000)	0.000	(0.000)
female	0.055	(0.055)	0.057	(0.058)
edu_middle	–0.060	(0.110)	–0.059	(0.112)
edu_high	–0.103	(0.111)	–0.084	(0.113)
urban_high	0.019	(0.063)	0.050	(0.061)
urban_middle	–0.092	(0.070)	–0.090	(0.072)
occup_pension	0.091	(0.127)	0.126	(0.139)
occup_nowork	0.007	(0.073)	0.012	(0.076)
size_hh	0.048*	(0.026)	0.053*	(0.028)
victsmall_sev	0.025	(0.085)	0.054	(0.090)
victsmall_notsev	–0.126*	(0.074)	–0.152**	(0.077)
victserious_sev	0.129	(0.108)	0.053	(0.114)
victserious_notsev	–0.044	(0.111)	–0.055	(0.116)
partner	0.486***	(0.074)	0.474***	(0.076)
vict_rate	–3.189***	(1.194)		
d_mover	0.377	(0.569)		
d_mover × vict_rate	–1.049	(2.188)		
delta_victrate			–0.438	(0.351)
fear_rate	3.118***	(1.166)		
delta_fearrate			0.091	(0.311)
health	0.484***	(0.041)	0.503***	(0.044)
trust_index	0.046***	(0.006)	0.042***	(0.006)
social_norm	0.045**	(0.021)	0.045**	(0.021)
N	1711		1589	
pseudo R^2	0.068		0.068	

Remarks. *** = $\{p < 0.01\}$; ** = $\{0.01 \le p < 0.05\}$; * = $\{0.05 \le p < 0.10\}$. Standard errors in parentheses. We included dummies for missing observations for *health* and *trust_index* and a dummy for zero income. *d_mover* = 1 if moved between 2006 and 2008. Delta means % change in respective rate between 2006 and 2008. Dependent variable is *well-being*.

Second, we investigate whether well-being is associated with *changes* in an individual's regional victimization and fear indexes rather than the levels. The right hand columns of Table 12 present the results for the non-movers only. We find no significant effect of the changes in the regional variables. Of course it is possible that this is due to the fact that we only distinguish 25 regions, which gives too large regions to capture the probability of victimization and fear of crime in the neighborhood.

6. Conclusion

This paper studies subjective well-being by means of a survey of about 2000 Dutch respondents in 2008, focusing on its association with crime-related measures as well as health, trust, and social norms. The analysis allows us to distinguish a direct association between victimization of crime or the regional crime or fear of crime rate from indirect relations through trust, health, and social norms, which are related to crime-related measures as well as subjective well-being. This approach is different from the usual empirical strategy in the literature on well-being.

Victims in our sample are, as expected, more likely to be male and younger than 55 years. We find that victims have a lower mean score for subjective well-being than non-victims but this difference is not significant. This is confirmed in the regression results: when we control for basic characteristics (age, income, gender, urbanization etcetera), we only find a weak effect of not severe small crimes and no significant effect of more serious crimes. This does not change if we extend the specification with trust, social norms, perceived health, the regional victimization rate, and the regional fear of crime rate. On the other hand, we do find a significantly negative association between well-being and the regional rate of crime but also a somewhat unexpected positive association with an index for fear of crime at the same regional level. Moreover, we find that people who are healthy, have more trust in others, or have higher social norms are significantly happier.

That the relation between victimization and well-being is not a clear or strong one is not new: Møller (2005), Michalos and Zumbo (2000) and Cohen (2008) concluded that crime-related issues (including victimization of violent and property crimes) have very little impact on well-being. They find a significant negative impact but the results in studies that use regression analysis are not robust. There are some limitations regarding how we measured personal victimization that may explain the weak result for personal victimization. First, the personal victimization question may be prone to measurement errors. We use a five year window, which may be too long to capture a strong effect. A shock, typically, mainly affects a person's life immediately after the fact and most psychological problems disappear after a few months (Denkers and Winkel, 1998). Another source of measurement error may come from telescoping as a result of misplacing the timing of victimization. Second, we define two crime types, serious and small crimes, which may be defined too broadly so that our respondents have problems understanding which crimes belong to each category. Third, sorting or endogeneity as a result of unobserved individual characteristics that influence both victimization and well-being might play a role (see Cornaglia, Leigh, 2011). In contrast, the results of Helliwell (2006) and Ravallion and Lokshin (2001) suggest that accounting for potential endogeneity would not change the results significantly.

References

Alesina A., Di Tella R., MacCulloch R. (2004). Inequality and happiness: Are Europeans and Americans different? *Journal of Public Economics*, 88, 2009–2042.

Bardasi E., Francesconi M. (2004).The impact of atypical employment on individual wellbeing: Evidence from a panel of British workers. *Social Science and Medicine*, 58, 1671–1688.

Barefoot J. C., Maynard K. E., Beckham J. C., Brummett B. H., Hooker K., Siegler I. C. (1998). Trust, health, and longevity. *Journal of Behavioral Medicine*, 21, 517–526.

Bjørnskov C. (2003). The happy few: Cross-country evidence on social capital and life satisfaction. *Kyklos*, 56, 3–16.

Bjørnskov C. (2006). The multiple facets of social capital. *European Journal of Political Economy*, 22, 22–40.

Blanchflower D. G., Oswald A. J. (2004). Well-Being over time in Britain and the USA. *Journal of Public Economics*, 88, 1359–1386.

Britt C. L. (2001). Health consequences of criminal victimization. *International Review of Victimology*, 8, 63–73.

Clark A. E., Oswald A. J. (1994). Unhappiness and unemployment. *The Economic Journal*, 104, 648–659.

Cohen M. A. (2008). The effect of crime on life satisfaction. *Journal of Legal Studies*, 37, S325–S353.

Cornaglia F., Leigh A. (2011). Crime and mental wellbeing. *CEP Discussion Paper* 1049, Center for Economic Performance, London.

Davies S., Hinks T. (2010). Crime and happiness amongst heads of households in Malawi. *Journal of Happiness Studies*, 11, 457–476.

Denkers A. J. M., Winkel F. W. (1998). Crime victims' well-being and fear in a prospective and longitudinal study. *International Review of Victimology*, 5, 141–162.

Deutsch M. (1958). Trust and suspicion. *The Journal of Conflict Resolution*, 2, 265–279.

Di Tella R., MacCulloch R. J. (2008). Gross national happiness as an answer to the Easterlin paradox? *Journal of Development Economics*, 86, 22–42.

Di Tella R., MacCulloch R. J., Ñopo H. (2008). Happiness and beliefs in criminal environments. *Working Paper* 662. Inter-American Development Bank, Washington DC.

Di Tella R., MacCulloch R. J., Oswald A. J. (2003). The macroeconomics of happiness. *The Review of Economics and Statistics*, 85, 809–827.

Diener E., Suh E. M., Lucas R. E., Smith H. L. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin*, 125, 276–302.

Dolan P., Loomes G., Peasgood T., Tsuchiya A. (2005). Estimating the intangible victim costs to violent crime. *The British Journal of Criminology*, 45, 958–976.

Dolan P., Moore S. C. (2007). From preferences to experiences: Valuing the intangible victim costs of crime. *International Review of Victimology*, 14, 265–280.

Dolan P., Peasgood T., White M. (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of Economic Psychology*, 29, 94–122.

Douhou S., Magnus J. R., van Soest A. (2011). The perception of small crime. *European Journal of Political Economy*, 27, 749–763.

Douhou S., Magnus J. R., van Soest A. (2012). Peer reporting and the perception of fairness. *De Economist*, 160, 289–310.

Dustmann C., Fasani F. (2011). Crime and mental health in the UK. http://dipeco.economia.unimib.it/web/seminari/fasani.pdf.

Easterlin R. A. (1974). Does economic growth improve the human lot? Some empirical evidence. In: P. A. David and M. W. Reder (Eds.), *Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz*, 89–125. New York: Academic Press.

Frey B. S., Stutzer A. (2002). What can economists learn from happiness research? *Journal of Economic Literature*, 40, 402–435.

Gibbons S. (2004). The costs of urban property crime. *The Economic Journal*, 114, F441–F463.

Hanson R. F., Sawyer G. K., Begle A. M., Hubel G. S. (2010). The impact of crime victimization on quality of life. *Journal of Traumatic Stress*, 23, 189–197.

Helliwell J. F. (2003). How's Life? Combining individual and national variables to explain subjective well-being. *Economic Modelling*, 20, 331–360.

Helliwell J. F. (2006). Well-being, social capital and public policy: What's new? *The Economic Journal*, 116, C34–C45.

Inglehart R. (1996). The diminishing utility of economic growth: From maximizing security toward maximizing subjective well-being. *Critical Review*, 10, 509–531.

Kingdon G. G., Knight J. (2006). Subjective well-being poverty versus income poverty and capabilities poverty? *The Journal of Development Studies*, 42, 1199–1224.

Koss M. P., Koss P. G., Woodruff W. J. (1991). Deleterious effects of criminal victimization on women's health and medical utilization. *Archives of Internal Medicine*, 151, 342–347.

Koss M. P., Woodruff W. J., Koss P. G. (1990). Relation of criminal victimization to health perceptions among women medical patients. *Journal of Consulting and Clinical Psychology*, 58, 147–152.

Michalos A. C., Zumbo B. D. (2000). Criminal victimization and the quality of life. *Social Indicators Research*, 50, 245–295.

Møller V. (2005). Resilient or resigned? Criminal victimisation and quality of life in South Africa. *Social Indicators Research*, 72, 263–317.

O'Fallon M. J., Butterfield K. D. (2005). A review of the empirical ethical decision-making literature: 1996–2003. *Journal of Business Ethics*, 59, 375–413.

Oudejans M., Vis C. M. (2008). Slachtoffers van (poging tot) oplichting. Survey conducted for WODC EWB. CentERdata, Tilburg.

Poortinga W. (2006). Social capital: An individual or collective resource for health? *Social Science and Medicine*, 62, 292–302.

Powdthavee N. (2005). Unhappiness and crime: Evidence from South Africa. *Economica*, 72, 531–547.

Praag B. M. S. van, Baarsma B. E. (2005). Using happiness surveys to value intangibles: The case of airport

noise. *The Economic Journal*, 115, 224–246.

Putnam R. (1993). *Making democracy work: Civic traditions in modern Italy*. Princeton: Princeton University Press.

Ravallion M., Lokshin M. (2001). Identifying welfare effects from subjective questions. *Economica*, 68, 335–357.

Rose R. (2000). How much does social capital add to individual health? A survey study of Russians. *Social Science and Medicine*, 51, 1421–1435.

Stutzer A., Lalive R. (2004). The role of social work norms in job searching and subjective well-being. *Journal of the European Economic Association*, 2, 696–719.

Sumner L. W. (1996). *Welfare, happiness and ethics*. Oxford: Clarendon Press.

Winkelmann L., Winkelmann R. (1998). Why are the unemployed so unhappy? Evidence from panel data. *Economica*, 65, 1–15.

Winkelmann R. (2005). Subjective well-being and the family: Results from an ordered probit model with multiple random effects. *Empirical Economics*, 30, 749–761.

Appendix. Variable Definitions

Table A1. Variables with explanation

	Binary variables
female	1 if respondent is a woman
edu_middle	1 if respondent's highest education is secondary school
edu_high	1 if — at least vocational school
occup_pension	1 if — is retired or ≥ 65 years
occup_indep	1 if — works as independent entrepreneur or in a family firm
occup_nowork	1 if — has no occupation (incl. students)
partner	1 if — lives together with a partner (married or unmarried)
urban_high	1 if — lives in an urbanized area
urban_middle	1 if — in an area with intermediate urban character
victim_small	1 if — was victim of incorrect behavior in the past 5 years
victim_serious	1 if — of a serious crime in the past 5 years
victsmall_sev	1 if — was victim of a small crime in the past 5 years that is perceived severe
victsmall_notsev	1 if — was victim of a small crime in the past 5 years that is perceived *not* severe
victserious_sev	1 if — was victim of a serious crime in the past 5 years that is perceived severe
victserious_notsev	1 if — was victim of a serious crime in the past 5 years that is perceived *not* severe
	Non-binary variables
age	age of respondent (in years)

health	self-assessed health on a scale from 1: poor to 5: excellent
hh_lincome	log of gross monthly household income
mvictsmall_sev	0 if no victim, 1 if — was once victim, 2 if — was 2–5 times a victim, and 3 if more than 5 times victim of a small crime in the past 5 years that is perceived severe
mvictsmall_notsev	0 if no victim, 1 if — was once victim, 2 if — was 2–5 times a victim, and 3 if more than 5 times victim of a small crime in the past 5 years that is perceived *not* severe
mvictserious_sev	0 if no victim, 1 if — was once victim, 2 if — was 2–5 times a victim, and 3 if more than 5 times victim of a serious crime in the past 5 years that is perceived severe
mvictserious_notsev	0 if no victim, 1 if — was once victim, 2 if — was 2–5 times a victim, and 3 if more than 5 times victim of a serious crime in the past 5 years that is perceived *not* severe
social_norm	average of answers to short questions on severity of 18 small crimes on a scale from 1: not severe at all to 10: very severe
size_hh	number of members in a household
trust1	trust in others on a scale from 1: one cannot be very careful enough to 11: most people can be trusted
trust2	honesty of others on scale from 1: most people try to take advantage of others to 11: most people try to be honest
trust3	helpfulness of others on a scale from 1: people are selfish to 11: people try to be helpful
trust_index	degree of trust in other people (from 3: no trust to 33: maximum trust)
fear_rate	rate of people within a region that feel unsafe in 2008
vict_index	severity of crime(s) respondent has been victim of (from 0: not a victim to 20: victim of small and serious crime and both considered very severe)
vict_rate	rate of victimization within a region in 2008
well-being	subjective well-being on a scale from 1: very unhappy to 10: very happy