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## Risk Factors of Violence in Finland: A Register Based Study

### Summary

Prior violent crime is the most powerful predictor of violent crime. However, the following factors emerge as predictors when the individual's general propensity for violence has been controlled for:

- Low educational attainment, low income and low occupational level are predictors of violence
- Living outside marriage places a person at risk for violent behaviour
- Persons who become mothers or fathers as teenagers have an above-average risk of violent behaviour. Similarly, people who were born to a teenage mother have an above-average risk of violence
- Residentially mobile people are more at risk of becoming violent offenders than residentially stable people, net of economic and marital problems
- Situational and structural causes of violence remain significant predictors when economic, reproduction, and mobility related factors are held constant. Living in a big city, or in an area with high alcohol consumption, increases violence risk
- All the above results are main effects that remain robust when an extensive repertory of variables is held constant. They reflect, with high probability, non-spurious associations ultimately based on causation

The Risk Factors of Crime in Finland project aims at providing policy makers with an instrument to evaluate the crime effects of (a) various social policy options and (b) societal changes which unfold largely irrespective of policy decisions

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## 1 The aims of the project

Many policy decisions affect people's life circumstances in a manner that may also influence their likelihood or propensity to commit crimes. If alcohol availability is greatly increased, the incidence of alcohol related brawls, fights and family violence may show a rise. If poverty increases due to societal processes or policy decisions, this may result in more people experiencing criminogenic strain. If economy changes, or is deliberately changed, so that people have to move from one place to another, this may break social ties causing control deficits and increase in crime.

Clearly, it would be useful to know how social policy decisions are translated into increases or decreases in crime. In an ideal situation, policy programmes would be evaluated by experimental research with adequate control groups of individuals or aggregated groups (such as areas). However, practical, ethical and legal obstacles often stand in the way of experimental design. On rare occasions, natural experiments are available when, for example, policy decisions alter the availability of alcohol (Kivivuori 2003; Sirén & Lehti 2006). More commonly, policy makers must do without causal (or any kind of) evaluations.

The Risk Factors of Crime in Finland (RFCF) research project was launched to provide additional insight into the likely policy consequences of social policy decisions. It utilizes the abundance of register data available on the potential risk factors of crime, and studies their association with crime involvement. In the future, the possibility of simulating the crime effects of various kinds of social and criminal policy changes will be probed. In principle, such simulation results could be used in the quantitative estimation of crime effects of legislative and other political or societal changes.

## 2 Data

**Sample.** The primary data, a random sample of 100000 males and 50000 females was gathered from the Population Information System administered by the Population Register Centre. In addition to stratification by sex, the sample was stratified according to age, so that young people at the top of the age-crime curve were over-sampled. The differential sampling ratios were adjusted by weights (age & sex) in the database, so that the results represent the actual population.

**Register sources.** All Finnish citizens and foreigners who have lived in Finland for at least a year possess a personal identification code. This code was used to combine register data from various government sources into the RFCF database. The various register sources are listed in Appendix 1. The RFCF database is currently under construction and will contain even more information in the future.

**Temporal order of variables.** Since the RFCF project analyses causal connections, an important aspect of the design is the temporal order of the variables. As a rule, the independent variables are observations preceding the measurement of the dependent variable (crime). In principle, the database offers the additional option to reverse this order by analysing the impact of crime on people's socio-economic position and other social factors.

**Limitations.** In this report, unless otherwise stated, all references to criminal behaviour refer to offences recorded by the police, which constitute only a part of all offences committed. The Finnish national crime victim survey (2006) shows that of all cases involving at least hitting, 23 per cent were reported to the police (Sirén et al. 2007, 22). As a rule, the more serious the incident, the more likely it is recorded by the police. The RFCF database, therefore, focuses on the more serious types of criminal offending. It supplements survey based data which typically exclude the most serious offences committed by people who do not respond to surveys.

The research brief examines the predictors of violent crimes. The dependent variable of violent crime includes the following legal categories: petty assault, assault, aggravated assault and attempted homicide. The data deals with crimes recorded by the police. The independent and dependent variables and their register sources are listed in table 1.

Table 1. Register sources and variables

Population Register Centre / Population Information System:

- Age
- Sex
- Native language
- Parents' age
- Marital status
- Number of children
- Children's age
- Current municipality
- No permanent address
- Residential mobility

Statistics Finland:

- Education 2004
- Vocational status 2004
- GINI Index of municipalities 2004

Finnish Tax Administration:

- Annual income 2004

National Research and Development Centre for Welfare and Health:

- Alcohol consumption in municipalities

Legal Register Centre / National Research Institute of Legal Policy:

- Convicted of violent crime 1999-2004

Police information system (PATJA):

- Suspected of violent crime 2005-2006

### 3 Bivariate associations

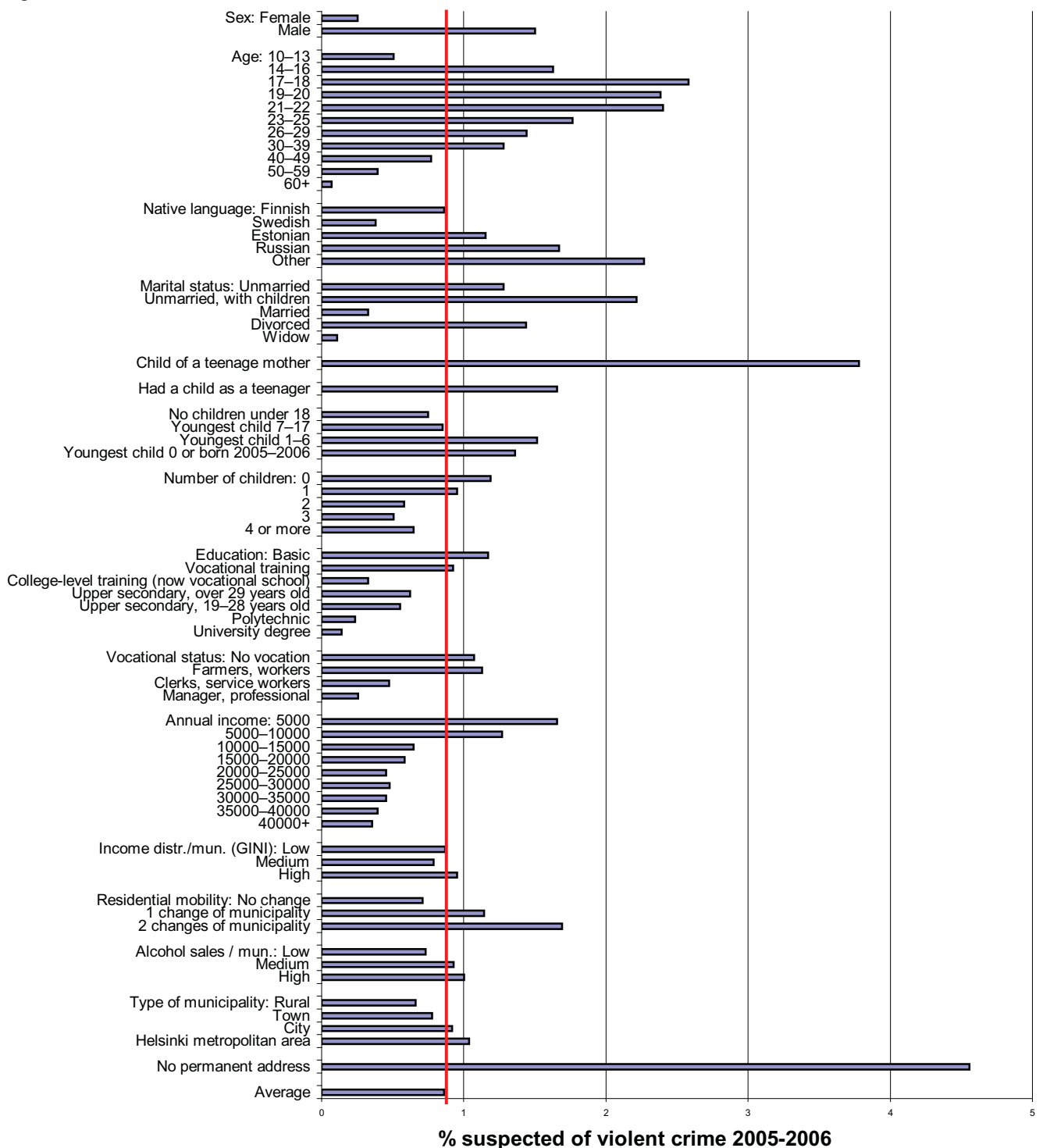
Of the total research population, 0,9 per cent committed a violent crime in the period 2005-2006. This baseline is indicated in red in Figure 1.

Figure 1 shows bivariate associations between violent crime and the various variables available for analysis. Based on this overview, the following socio-demographic factors seem to be pertinent to crime causation: lack of permanent address, being a child of a teenage mother, being 18-21 years of age, having a cultural identity other than Finnish (Finnish- or

Swedish-speaking), and having children outside marriage. Annual income and the level of education are also related to the risk of committing a violent crime. People with low income have a higher prevalence of violence than those in middle and high income categories. Education and violence, on the other hand, seem to be linearly associated: the less education, the higher the violence prevalence.

Since these associations are bivariate, it is possible that they reflect spurious links between risk factors. Multivariate analyses are therefore called for.

Figure 1. Bivariate associations



## 4 Multivariate analysis

**Logistic regression.** Logistic regression was used as the method of analysis. The binary-valued dependent variable was whether an individual committed a violent crime during 2005–2006 or not. Potential predictors of violence were introduced in five blocks. In addition to the variables in the bivariate analysis, in the fifth block a previous conviction for a violent crime (in 1999–2004) was added as a predictor.

**Age.** The bivariate association shows how the likelihood of committing a crime of violence varies with age, peaking in the early adulthood. Age, however, is not a risk factor in the same sense as factors which are either permanent characteristics of an individual or which may be subject to a change during his/her lifespan. When examining the significance of such risk factors, age is controlled for.

**Static factors.** By static factors we refer to attributes which remain the same throughout an individual's life cycle. Not surprisingly, male sex remains an important risk factor of violent behaviour even in the final model specification.

In bivariate analyses immigrant background, as measured by native language, was associated with violence risk (Figure 1). Immigrant background refers to groups outside the Finnish- or Swedish-speaking population. In multivariate model the link erodes when socio-economic variables like education, occupation and income are controlled for. This suggests that the above-average violence risk of immigrant groups relates to their comparative social deprivation. The largest immigrant groups in Finland originate from Russia, Estonia, Sweden and Somalia.

Being a part of the Swedish-speaking population of Finland is a protective factor against involvement in violence. The difference is only partially a function of social, economic and mobility related factors. The finding is consistent with the results of prior self-report delinquency surveys (Obstbaum 2006).

Having been born to a teenage mother is a robust correlate of violent offending.

**Family and sexual behaviour related factors.** The marital status of a person is a robust predictor of offending. People who are unmarried with children tend to have an above-average violence propensity. The same applies the divorced. On the other hand, the protective effect of being married disappears when age and socio-economic factors are controlled for.

Having many children (4 or more) seems to slightly increase the likelihood of violent offending, although the increase is not statistically significant. Being a teenage mother or father does not seem to be a statistically significant predictor when past criminal involvement is controlled. Children's age does not seem to be an important factor either, although having young

children (1–6 years of age) does slightly increase the risk of violent offending until geographical factors are controlled for.

The findings related to sexual factors are consistent with a self-selection interpretation suggesting that impulsive and aggressive people are likely to find themselves outside marital relationships. Lack of rewarding marital ties also leads to a deficit in social control. Self-selection and social causation simultaneously function to increase the likelihood of violence.

**Economic and social deprivation.** Lack of education is a predictor of violent offending. Indeed, one might argue that remaining at the lowest educational level is only surpassed by prior criminality and male sex as the most robust predictor of violent crime. This is again important because the model controls the influence of social deprivation and income. The education variable thus seems to tap into something which is unrelated to the economic aspects of education. A conceivable interpretation is that educational level partially measures some personal qualities like cognitive skills and ability to defer gratification. The finding is consistent with prior survey research among adolescent population which have been able to hold personal impulsivity constant (Salmi & Kivivuori 2006).

**Geographical and situational factors.** Living in the Helsinki metropolitan area or some other large city increases the likelihood of violent behaviour. Municipalities with high alcohol consumption are also associated with an increased violence risk. This suggests that the opportunity structure for alcohol related violence is an independent cause of crime, net of other variables included in the model.

The income distribution of municipality (GINI) does not have a statistically significant effect on offending. When interpreting the finding, it is worth noting that in international terms, Finland is a nation of relatively equal wealth distribution.

People who move from one place to another tend to be more violent than people who remain in one place for a longer period of time. When this finding is interpreted, it is of some importance to note that poverty, lack of education and low SES are controlled. The role of residential mobility as a cause of crime is not spurious in the sense that the variable would simply tap into the functioning of deeper causes. However, residential mobility can partially measure individual-level propensities such as impulsiveness.

**Previous violent behaviour.** Having a previous conviction of violent crime is strongly correlated with the probability of committing violent crimes. The RFCF data does not include variables tapping into the individual-level personality features of the research subjects. Past violent behaviour probably catches some of the variation caused by stable personality features.

Table 2. Regression model for predictors of violent crime. Odds ratios, constants and Nagelkerke  $r^2$ . Bold figures indicate statistically significant ( $p < 0,05$ ) differences.

Static variables	Age	10–13	<b>0,40</b>	<b>0,54</b>	<b>2,36</b>	<b>2,67</b>	<b>2,43</b>
		14–16	1,31	<b>1,74</b>	<b>7,68</b>	<b>8,81</b>	<b>7,93</b>
		17–18	<b>2,11</b>	<b>2,75</b>	<b>12,24</b>	<b>13,91</b>	<b>11,48</b>
		19–20	<b>1,92</b>	<b>2,41</b>	<b>3,94</b>	<b>4,01</b>	<b>3,64</b>
		21–22	<b>1,94</b>	<b>2,37</b>	<b>2,73</b>	<b>2,74</b>	<b>2,40</b>
		23–25	<b>1,42</b>	<b>1,69</b>	<b>1,98</b>	<b>1,92</b>	<b>1,70</b>
		26–29	1,13	<b>1,31</b>	<b>1,34</b>	1,27	1,17
		30–39	1	1	1	1	1
		40–49	<b>0,62</b>	<b>0,57</b>	<b>0,54</b>	<b>0,57</b>	<b>0,61</b>
		50–59	<b>0,32</b>	<b>0,33</b>	<b>0,24</b>	<b>0,27</b>	<b>0,31</b>
	60+	<b>0,07</b>	<b>0,07</b>	<b>0,03</b>	<b>0,03</b>	<b>0,05</b>	
	Sex	female	1	1	1	1	1
		male	<b>5,66</b>	<b>6,14</b>	<b>6,22</b>	<b>6,08</b>	<b>5,00</b>
	Native language	Finnish	1	1	1	1	1
		Swedish	<b>0,45</b>	<b>0,47</b>	<b>0,53</b>	<b>0,57</b>	<b>0,59</b>
Russian		<b>1,70</b>	1,67	1,16	0,88	0,83	
Estonian		1,22	1,23	0,87	0,65	0,66	
other		<b>1,85</b>	<b>1,82</b>	0,99	0,70	0,70	
	child of a teenage mother	<b>3,32</b>	<b>2,85</b>	<b>2,28</b>	<b>2,18</b>	<b>1,97</b>	
Familial & marital status	Marital status	unmarried, no children	1	1	1	1	
		unmarried, children	<b>2,58</b>	<b>2,23</b>	<b>2,07</b>	<b>1,71</b>	
		married	<b>0,66</b>	0,90	0,86	0,83	
		divorced	<b>3,57</b>	<b>3,45</b>	<b>3,02</b>	<b>2,62</b>	
		widow	1,87	1,93	1,79	1,74	
	Number of children	0	1	1	1	1	
		1	0,85	0,88	0,92	0,93	
		2	0,84	0,94	1,01	1,04	
		3	0,86	0,91	1,01	1,03	
		4+	1,38	1,22	1,34	1,37	
Age of youngest child	no children under 18	1	1	1	1		
	7–17 years old	1,16	1,23	1,23	1,18		
	1–6 years old	<b>1,35</b>	<b>1,36</b>	1,33	1,28		
	0 years old or born during 2005–2006	0,99	1,03	1,00	0,97		
	had child as a teenager	<b>2,90</b>	<b>1,98</b>	<b>2,02</b>	1,91		
Socio-economic status	Education	university	1	1	1	1	
		polytechnic	1,24	1,29	1,28	1,28	
		upper secondary, under 29	0,74	0,77	0,82	0,82	
		upper secondary, over 29	<b>2,11</b>	<b>2,11</b>	2,02	2,02	
		vocational training	<b>2,78</b>	<b>3,10</b>	<b>2,68</b>	<b>2,68</b>	
		college-level training (now mostly vocational schools)	<b>2,44</b>	<b>2,64</b>	<b>2,42</b>	<b>2,42</b>	
	Vocation	basic education	<b>4,89</b>	<b>5,12</b>	<b>3,88</b>	<b>3,88</b>	
		no vocation, under 25 years old	1	1	1	1	
		manager, professional	<b>0,66</b>	<b>0,62</b>	<b>0,63</b>	<b>0,63</b>	
		clerk, services worker	0,85	0,81	0,84	0,84	
		farmer, worker	0,98	1,00	0,99	0,99	
	Yearly income (euros)	no vocation, over 25 years old	<b>1,96</b>	<b>1,84</b>	<b>1,65</b>	<b>1,65</b>	
		40 000+	1	1	1	1	
0–5 000		<b>1,93</b>	<b>1,75</b>	1,52	1,52		
5 000–10 000		<b>1,74</b>	<b>1,75</b>	<b>1,61</b>	<b>1,61</b>		
10 000–20 000		1,25	1,27	1,24	1,24		
20 000–30 000		0,89	0,90	0,92	0,92		
	30 000–40 000	0,89	0,88	0,89	0,89		
Residential & mobility related variables	Municipality type	rural	1	1	1	1	
		town	1,12	1,07	1,07	1,07	
		city	<b>1,29</b>	<b>1,25</b>	<b>1,25</b>	<b>1,25</b>	
		Helsinki metropolitan area	<b>1,53</b>	<b>1,46</b>	<b>1,46</b>	<b>1,46</b>	
	Alcohol consumption in municipality	low	1	1	1	1	
		medium	1,11	1,11	1,10	1,10	
		high	<b>1,37</b>	<b>1,42</b>	<b>1,42</b>	<b>1,42</b>	
	Residential mobility	no	1	1	1	1	
		1 change of mun.	<b>1,22</b>	<b>1,20</b>	<b>1,20</b>	<b>1,20</b>	
		2 changes of mun.	<b>1,64</b>	<b>1,47</b>	<b>1,47</b>	<b>1,47</b>	
Income differences in municipality (GINI)	No permanent address	<b>2,48</b>	<b>1,98</b>	<b>1,98</b>	<b>1,98</b>		
	low	1	1	1	1		
	medium	0,88	0,88	0,90	0,90		
	high	0,97	0,97	1,00	1,00		
	Previous conviction of violent crime 1999–2004				<b>8,73</b>		
	Constant	-5,58	-5,95	-7,42	-7,85	-7,56	
	Nagelkerke R2	0,12	0,15	0,19	0,20	0,24	

Being a victim of violent crime is strongly associated with having committed a violent crime. Lifestyle features as well as personal characteristics, like the inclination to use violence in conflict situations, probably explain this association.

However, the relevance of this factor as a predictor of violence depends on whether the victimisation has preceded the person's own violent behaviour. Here this is not known. Another non-causal explanation to the connection is that in a fight both parties are often recorded as the suspect and the injured party. For this reason previous violent victimization is not used as a predictor in the model. The relationship between committing violent offences and violent victimization will be examined in more detail later in this project.

## 5 Future of the project

Due to the incompleteness of the data, the results presented in the report are of preliminary nature. The RFCF database will be expanded by including information about parental factors such as parents' education, income, marital status, death, and the number of siblings. The availability of additional register sources is under investigation. The possibility of including information about the health and accidents is being researched as well. A more detailed picture of the effect of one's possible long-term unemployment on criminal behaviour can be drawn when the data from the registers of the Social Insurance Institution of Finland are merged with the RFCF data.

In the next phase, we aim to examine the risk factors associated with the different types of crime, and comparisons between violent crimes, property crimes, traffic crimes and drug-related crimes will be made. Based on prior research, it is evident that risk factors vary over an individual's lifespan. Extensive longitudinal research has shown that the importance of various risk factors differs in pre-adolescent and adolescent populations (Hawkins et al. 2000, 6). It is, therefore, of some interest to explore the interaction of age with other predictors of crime. In the future it might also be possible to explore the effects of criminal behaviour on social adjustment when prior social adjustment is held constant.

One of the aims of the RFCF project is to create an information basis for the evaluation of likely crime consequences of policy changes and societal processes. For example, we might try to predict how changes in alcohol consumption, residential mobility, immigration, income distribution, or a combination of various changes, are likely to be reflected in recorded crimes and consequently in the case burden of the criminal justice system. For this purpose, we plan to study the possibilities of creating a dynamic microsimulation model of crime. In Finland, for example, prior predictions of the prison population have been based only on aggregate level data.

The simulation model represents the population at large based on the RFCF sample, and the convicted population based on information from the Legal Register Centre. The likelihood of first time offending is predicted through logistic regression and recidivism is modelled with proportional hazards regression. The model allows the researcher to create hypothetical scenarios by adjusting the simulation parameters (population structure, sentencing practices, reoffending rate). The goal is to predict the effects of different criminal policy decisions and sentencing options (*ceteris paribus*) on the number of crimes recorded by the police, number of convicted felons, number of punishments, the prison population and the costs of crime and the criminal justice system.

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