



Income inequality, poverty and crime across nations

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Abstract

We examine the relationship between income inequality, poverty, and different types of crime. Our results are consistent with recent research in showing that inequality is unrelated to homicide rates when poverty is controlled. In our multi-level analyses of the International Crime Victimization Survey we find that inequality is unrelated to assault, robbery, burglary, and theft when poverty is controlled. We argue that there are also theoretical reasons to doubt that the level of income inequality of a country affects the likelihood of criminal behaviour.

Keywords: Cross-national criminology; homicide; ICVS; income inequality; poverty

Many academics and social commentators argue that high levels of economic inequality have negative effects on societies. They claim that inequality only benefits a few wealthy citizens whereas most people suffer its consequences. The financial crisis of 2008 re-energized those debates. For example, in a best-selling book, Wilkinson and Pickett (2009) link economic inequality to a wide range of social evils, including lower social trust, impaired mental and physical health, excessive consumption, drug addiction, obesity, and failed education systems. For them, it is the context of inequality and not material poverty that generates these problems.

No academicians have argued more strongly about the negative consequences of economic inequality than sociologists (e.g., Neckerman and Torche 2007). The role of economic inequality has been of particular interest to sociologists interested in international variation in homicide rates. Until recently, the idea that high levels of inequality lead to higher homicide rates was conventional wisdom (Chamlin and Cochran 2005; Neapolitan 1997). That

wisdom was based on a large number of cross-national studies that have found a positive association between income inequality and homicide rates (e.g., Messner, Raffalovich and Shrock 2002; Fajnzylber, Lederman, and Loayza 1998, 2002a, 2002b; Pratt and Godsey 2003; see also Chamlin and Cochran 2005; LaFree 1999; Messner 2003; Neapolitan 1997 for reviews). Recent work by Pridemore (2008, 2011), however, has challenged this idea. We examine the issue further in this research and extend the analyses to other types of crime.

Before performing our empirical analyses, we discuss theoretical issues and prior research. We first discuss the theoretical basis for expecting poverty to produce crime. Poverty effects are more simple and straightforward than inequality effects since they do not necessarily involve the additional effects of reference groups. We then consider theoretical explanations of inequality effects, focusing on the role of reference groups, and the compatibility of the argument with the violence literature. Finally, we review the research on economic inequality and homicide and other crime.

Poverty and crime

The correlation between socioeconomic status and violent crime is well-established (e.g., Pratt and Cullen 2005; Sampson and Lauritsen 1994; Bailey 1984; Lee 2000). Its interpretation, however, is unclear. The relationship could be spurious if individual or group characteristics affect both economic success and criminal behaviour (Cusson 2005). It could also be that criminal behaviour affects socio-economic status, if prison or a criminal life-style interferes with job attainment (Cusson 2005). However, most scholars assume that living in poverty increases the likelihood of criminal behaviour. In fact, some of the most influential sociological theories of crime have involved attempts to explain the causal effects of socio-economic status. Some of these theories focus on discrimination and the lack of legitimate opportunities. For example, poor people may be more likely to commit crime because their opportunities for legitimate attainment of widely shared goals are blocked or because they are exposed to a wide variety of negative experiences (Merton 1938; Agnew 1999).¹ In addition, poor people may engage in violent crime to handle their grievances because they lack access to the legal system (Black 1976, 1983).

A second set of explanations focus on lower social controls, particularly those associated with disadvantaged neighbourhoods. Poor people are more likely to live in socially disorganized neighbourhoods with lower levels of collective efficacy than people with higher status (Bursik 1988; Sampson, Raudenbush, and Earls 1997). Neighbourhood effects may be enhanced if the risks of violence lead residents to adopt an aggressive posture or arm themselves (Anderson 1999; Felson and Paré 2010).

Third, some explanations focus on the tendency of people of low socioeconomic status to participate in violent or deviant subcultures (Anderson 1999; Miller 1958; Wolfgang and Ferracuti 1967). Their socialization experiences lead them to have attitudes that are conducive to crime, e.g., a belief that it is important to respond to disrespect with physical violence.

Economic inequality and crime

The assertion that economic inequality leads to crime is essentially a contextual argument involving the relative deprivation experienced by people living in poverty. Poor people compare their outcomes to the outcomes of their reference group and if their own outcomes are worse they feel deprivation. The effects of relative deprivation on crime are often attributed to the experience of frustration (Brush 1996; Krahn, Hartnagel, and Gartrell 1986). For example, Blau and Blau (1982) argued that:

Inequality in resources implies that there are great riches within view but not within reach of many people destined to live in poverty. There is much resentment, frustration, hopelessness, and alienation. (1982: 119) (see also, Agnew 1999; Wilkinson 2004)

These arguments are directly or indirectly based on the frustration aggression hypothesis, a theory that proposes a biological link between blocked attainment of goals and reactive or angry aggression (Dollard et al. 1939; Berkowitz 1993). Poor people are frustrated by high levels of inequality and this frustration leads them to engage in reactive aggression, usually targeting other poor people who did not produce the frustration.

A more sociological explanation is that inequality and relative deprivation generate anomie or institutional anomie where the rules governing conduct lack legitimacy and lose their force (Merton 1938; Messner and Rosenfeld 1997a, 1997b; Savolainen 2000). Related arguments suggest that inequality effects are due to a lack of social support or a weak welfare system (e.g. Antonaccio and Tittle 2007; Pratt and Godsey 2003).

The disagreement over whether crime is related to poverty or inequality is not an argument about whether people are affected by relative or absolute deprivation. Poverty effects may be due to relative deprivation as well as absolute deprivation. People evaluate outcomes in terms of their expectations, and those expectations are affected by their perceptions of the outcomes of others (social comparisons) and their own prior outcomes (temporal comparisons). Thus, poor people may suffer from absolute deprivation if their basic material conditions are insufficient, and they may suffer from relative deprivation if they think other poor people are doing better than them or their own circumstances have gotten worse over time. Those who hypothesize

effects of economic inequality are suggesting that the poor compare their outcomes to more prosperous individuals in some large social group or aggregate of which they are a member. They are claiming that lower status people feel relatively deprived because their outcomes are less favorable than those of wealthier residents of their country (or city or state). We now turn to a discussion of this claim.

Reference groups and economic inequality

Economic circumstances may affect relative deprivation, but their effect is mediated by the subjective interpretations of the actor: individuals respond to their 'definition of the situation' (Thomas and Thomas 1928). Explanations that emphasize relative deprivation must make assumptions about who people use as a reference group (Clark 1972; Cochran, Chamlin, Beeghley and Fenwick 2004; Easterlin 2001). In international studies the assumption is that people compare themselves to their compatriots. Reference group theory and research, on the other hand, emphasizes comparisons to smaller, more intimate groups, i.e., friends, families, and associates (Clark 1972; Cochran et al. 2004; Easterlin 2001, see also Runciman 1966). It is therefore not clear whether one should expect income inequality in large societies (i.e. countries) to produce feelings of relative deprivation.

Second, even if compatriots are a reference group, it is not clear that the number of wealthy people in a country makes a psychological difference in how people evaluate their outcomes. In every large society, there are privileged people who are highly visible in the mass media who can serve as a high standard of comparison. It may not matter whether they make up 0.01 per cent or 1 per cent of the population or whether they earn 50 times or 500 times more than the average worker. The size of that group or the proportion of the country's wealth in their hands may not be a salient factor in how people judge their own situation. Those who live in poverty may not even be aware of the level of inequality, but they are certainly aware of their own poverty.

Third, social comparison and relative deprivation are ubiquitous aspects of daily life that do not reflect economic success alone. We frequently encounter people who are more attractive, more talented, healthier, and more popular than ourselves so there is plenty of opportunity to suffer or be dissatisfied by comparison. In addition, temporal comparisons may lead individuals to feel frustrated when they are doing worse than they did in the past, even when they are doing better than others. All of these comparisons should dilute the contextual effect of the income distribution on feelings of relative deprivation. Contextual effects are typically weak; this one may be particularly so.

The violence literature

The inequality argument also contradicts some prominent literatures in the study of violence. First, it ignores the studies of the effects of neighbourhood contexts on violent crime. Those who study neighborhood effects make the opposite argument about the effects of inequality, although they use different language (e.g., Kubrin and Weitzer 2003; Parker and Reckdenwald 2008; Sampson, Raudenbush, and Earls 1997). They argue that crime rates should be highest in social contexts with 'concentrated disadvantage', i.e. in contexts where inequality is low but poverty is high. While the inequality argument suggests that poor people are more likely to commit crime if they live among wealthier people, the neighbourhood argument suggests that poor people are more likely to commit crime if they live among other poor people. Perhaps wealthy people produce relative deprivation but they also increase collective efficacy and provide social stability. Perhaps these processes offset each other, thereby producing no overall effect. It is interesting that two of the most influential literatures in sociological criminology make opposite predictions about the contextual effects of inequality on criminal behaviour, but do not influence or even acknowledge each other.

Second, the inequality argument contradicts the literature on who is likely to be the victim of criminal violence. It implies that offenders who have experienced relative deprivation should attack the rich and powerful. Research shows, however, that lower status people have much higher rates of victimization (Miethe, Stafford and Long 1987; Sampson and Lauritsen 1994). It could be argued that offenders displace their aggression onto other poor people or that they engage in random attacks. However, both qualitative and quantitative studies suggest that most violent incidents stem from interpersonal conflicts between the offender and victim (e.g., Jacobs and Wright 2006; Katz 1988; Luckenbill 1977; see Tedeschi and Felson 1994, for a review). Displaced aggression is rare and random targeting even rarer: offenders typically target the person with whom they have a grievance. Violent behaviour is instrumental, not an irrational outburst based on free-floating frustration.

Finally, the inequality argument contradicts the literature on relative deprivation and collective violence. Research on riots and revolutions suggests that relative deprivation does not affect behaviour unless people have specific grievances, and that their behaviour involves rational political action, not random acts of violence (Gurr 1968, 1970; Brush 1996; Walker, Wong and Kretzschmar 2002). Scholars who study collective behaviour now emphasize the purposive behaviour of individuals or small groups within larger gatherings rather than irrational 'mobs' attacking random victims (e.g., Goodwin 2001; McAdam, Tarrow and Tilly 2001; McPhail 1991).

Research on inequality and homicide

Given these theoretical issues, how does one explain relationships between inequality and homicide rates that have been found in international research? According to Pridemore (2008, 2011) effects of inequality have been observed because the research failed to control for poverty (see also Neumayer 2003). He pointed out that controlling for economic development or GDP per capita in international studies does not control for poverty because indices of economic development are measures of central tendency and do not reflect the situation of those at the bottom of the income hierarchy. He wondered why these studies did not control for poverty when research in the USA showed that poverty is a consistent predictor of homicide (e.g., Bailey 1984; Lee 2000). Pridemore (2008) then analysed the relationship between inequality and homicide rates controlling for the infant mortality rate, an indirect measure of poverty (see, e.g. Mosley and Chen 1984). Based on a sample of 46 countries, he found that homicide rates are related to infant mortality but that the relationship between homicide rates and the Gini index of income inequality is not statistically significant. In a later study, Pridemore (2011) re-examined the inequality vs. poverty question using three different datasets from prior published studies (Fajnzylber et al. 1998; Savolainen 2000). He found a positive effect of infant mortality and no effect of the Gini index based on Fajnzylber et al.'s data and on the Savolainen's female (victims) homicide data. He also found, however, that the infant mortality and the Gini index both have positive effects in Savolainen's male (victims) homicide data.

Messner, Raffalovich, and Sutton (2010) challenged Pridemore's interpretation of the meaning of infant mortality based on their analyses of 16 developed countries. They found that infant mortality rate was more strongly related to a measure of relative poverty (those who earn 60 per cent of the national median income) than a measure of absolute poverty (the percentage who can only afford a basic level of subsistence) ($r = 0.744$ vs. $r = 0.539$). In addition, infant mortality and relative poverty were significantly related to homicide rates, whereas absolute poverty measure was not. They argued that the relationship between infant mortality and homicide may reflect the effects of both absolute and relative poverty. The implication of their work regarding the effects of inequality is, however, unclear. Their measure of relative poverty does not address the upper end of the income distribution and therefore is not a measure of inequality. Also, their measure of absolute poverty may be too extreme to adequately measure poverty in developed countries. Finally, it is not clear why relative poverty would have an effect on infant mortality. The reason why absolute poverty is related to infant mortality is presumably because of its relationship to pre- and post-natal care (Mosley and Chen 1984).

A recent study by Ouimet (2012) attempted to disentangle the effects of income inequality and poverty with a large sample of 165 countries. Ouimet's

measure of poverty is based on 'excess infant mortality', a residualized variable that measures the effect of infant mortality net of Gross National Income per capita. Gross National Income is supposedly a measure of a country's wealth but its strong negative correlation with infant mortality ($r = -0.85$) suggests that it also reflects poverty. His main analysis showed that both income inequality and excess infant mortality rate have positive effects on the homicide rate. However, it is not clear whether the residual measure provides a fair test of the role of inequality vs. poverty. For example, the zero order correlation between the residualized infant mortality rate and homicide is only 0.31, while the correlation between inequality and homicide is 0.63.

Research on inequality and other crimes

Scholars rely on theories of crime, not theories of homicide, to explain the effects of inequality and poverty on homicide rates. If inequality or poverty is criminogenic, then it should have an impact on different types of crime. In fact, Merton's (1938) classic sociological treatment emphasizes crimes committed for profit. For example, the 'innovators' and the 'rebels' in his analysis are property offenders and criminal entrepreneurs, not murderers. The focus on homicide in research is based on methodological concerns, not theoretical preferences.

The relationship between income inequality and crimes that do not result in death has received much less attention. Most studies have been based on aggregate analyses of official data (e.g. Bennett 1991; Bourguignon 2001; Eisner 2002; Kick and LaFree 1985; Krohn 1978; LaFree and Kick 1986; Messner 1986). Some of these studies have found positive effects, some negative effects, and some no effects. The validity of these studies has been questioned primarily because of differences in crime reporting and recording across nations (Soares 2000).

A few studies have relied on data from the International Crime Victimization Survey (Neapolitan 2003; Tseloni and Farrell 2002; Van Wilsem 2004; Van Wilsem, de Graaf, and Wittebrood 2002). All of them show some evidence for a positive association between inequality and victimization. Only one of the studies was multilevel (Van Wilsem, de Graaf, and Wittebrood 2002) and it found mixed evidence: income inequality was associated with crimes of theft within victims' neighbourhoods of residence (but not outside), and violent crimes outside the neighbourhood of residence (but not within). Importantly, it did not control for poverty. Only one of the aggregate studies (Neapolitan 2003) included a control for poverty (infant mortality), and its evidence was also mixed. The aggregate analyses suggested that income inequality had a positive effect on assault, robbery, and burglary, no effect on theft and sexual offences, and a negative effect on fraud. However, Neapolitan's crime

measures were based on data from surveys of capital cities while his measures of inequality and poverty were based on national data. For most countries, the economic situation of their capital city is likely to be different from that of the whole nation.

Current study

The goal of the current study is to further assess whether income inequality or poverty is associated with cross-national variation in crime. First, we present an analysis of the Gini index as a measure of inequality. We do a simulation study to show that it reflects the effect of poverty as well as inequality. The simulation provides additional evidence that it is important to control for poverty when examining the effects of inequality. Second, we estimate effects of inequality and poverty (infant mortality) on homicide rates using a larger data set than Pridemore (2008, 2011) used (63 vs. 46 or fewer countries). A larger data set allows more power to detect an inequality effect and reduces model sensitivity. The latter problem is particularly important given small samples and the large correlations between the independent variables. Third, to address Messner, Raffalovich, and Sutton (2010) work, we use a more direct measure of poverty than the infant mortality rate. It will turn out that the measurement of poverty and the sample size make a difference.

Finally, we estimate the effects of inequality and poverty on other types of crimes. For these analyses we perform a multilevel analysis of the International Crime Victimization Survey (ICVS). We examine whether respondents are more likely to be victims of assault, robbery, burglary, and other theft in countries with either high levels of inequality or high levels of poverty. Multilevel models have an advantage over aggregate analyses because they make it possible to control for compositional effects. We cannot directly examine whether the poor commit more crime using a victimization survey. However, we can test whether individuals are at greater risk of victimization if they live in a country with high levels of inequality or poverty.

Our analyses focus on the main effects of inequality and poverty not statistical interactions. The idea that individuals respond to relative deprivation, however, implies that only the poor should experience relative deprivation. To our knowledge, no one has ever tested for statistical interactions, whether they were examining the effects of inequality on crime or on some other outcome (see Neckerman and Torche 2007 for a review). We do not have a measure of the individual offender's socioeconomic status in either data set. Nor do we have the statistical power to adequately examine statistical interactions (although we do a few such analyses). Our assumption is that since most offenders are of lower status any effect of inequality will be revealed in an analysis of main effects.

An analysis of the Gini index

Most criminological studies of inequality rely on the Gini index. Measures of income inequality like the Gini, however, are likely to reflect the effects of both poverty as well as economic inequality because income distributions are highly skewed – there are many more poor people than rich people. Because of this *log-normal* distribution high levels of inequality are associated with high levels of poverty (Chakravarty 2009; Limpert et al. 2001; Singh and Maddala 1976). Including a measure of development or average income per capita does not address this problem, since they are measures of central tendency.

We present the results of two simulations in Table I to illustrate the problem. Both simulations involve hypothetical nations with the same population size (1,000,000), the same GDP per capita (\$10,000 per capita), and the same form of the income distribution (log-normal). One nation has high income inequality (standard deviation = \$5,000) while the other nation has low income inequality (standard deviation = \$2,000); note that these are realistic values. We use the percentage of people who earn less than half of the average income (< \$5,000) as a measure of the percentage of people living in poverty. The table shows that six times as many people are living in poverty in the less egalitarian nation than in the more egalitarian nation (6 per cent vs. 1 per cent). Results are similar if the simulations are repeated with different random seeds or if different thresholds of poverty are used (e.g. if the poverty threshold is \$3,000 instead of \$5,000).²

In sum, most previous research includes controls for economic development not poverty. As Pridemore (2008) points out, indicators of economic development do not measure poverty. The simulation provides further evidence that it is inappropriate to use the Gini index or other measures of inequality without controlling for poverty. Nations with high levels of inequality also have high poverty rates, even when the level of economic development is controlled. Studies based on the Gini index are therefore difficult to interpret, since they

Table I: *Income inequality and the percentage of people living in poverty*

	Simulation 1: A more egalitarian nation	Simulation 2: A less egalitarian nation
\$0–4,999 (Poverty)	1%	6%
\$5,000–9,999	51%	44%
\$10,000–14,999	45%	31%
\$15,000–19,000	2%	12%
\$20,000 +	1%	7%

Note:

In both simulations, the total population is 1,000,000 and the average GDP per capita is \$10,000. Income inequality is greater in the less egalitarian nation (standard deviation = \$5,000) than in the more egalitarian nation (standard deviation = \$2,000).

reflect the effect of both income inequality and poverty. One must control for the proportion of people living in poverty for the Gini index to reflect an inequality effect.

A reanalysis of international homicide data

We now attempt to disentangle the effects of income inequality and poverty on homicide rates for 63 nations. We include the same control variables as Messner, Raffalovich, and Shrock (2002), one of the most influential studies in this area. We first attempt an approximate replication of the analysis by Messner, Raffalovich, and Shrock. We then substitute our poverty measures for the measure of economic development and compare the results. Following Pridemore (2008, 2011), our hypothesis is that income inequality is unrelated to homicide rates, once poverty is adequately controlled.

We use OLS regression with Expectation–Maximization for missing cases (SPSS software version 20). Countries with missing data on independent and control variables can still be included. The models are identical to OLS regressions, but have the advantage of handling the estimation with missing data instead of deleting cases, which preserves sample size. Another advantage is that plausible values are imputed (with added measurement error to avoid over-fitting), so these values are easy to re-analyse. We also checked for outliers and did not find any. Note that using a logarithmic transformation (Log 10) of the homicide rate normalizes the distribution of the variable and helps reduce the impact of potential outliers.

Measurement

We obtained our measure of the homicide rate per 100,000 population from the World Health Organization. The homicide rate was logged to normalize its distribution and reduce the statistical impact of nations with very high homicide rates. When the data were available, we used a six year average to minimize random yearly fluctuations (between 1990–2000). When fewer years of data are available, the average was calculated from all available years. Note that at least two years of data are used for every nation. Appendix I shows a list of the nations included in the analyses.

Income inequality, economic development, and poverty are our main independent variables. Income inequality is measured with the Gini index, which is available online as part of the World Income Inequality Database (United Nations 2000). Following the suggestion by Deninger and Squire (1996), we added 6.6 to expenditure-based Gini statistics to make them more comparable with income-based Gini statistics. Our measure of development is provided by

the United Nations' Human Development Report (1998). The Human Development Index (HDI) is based on the life expectancy at birth, the adult literacy rate, the school enrollment ratio, and the income per capita adjusted for the cost of living.

Following Pridemore (2008, 2011), we use the infant mortality rate (logged) as our first measure of poverty. Our second measure of poverty is based on two separate indices from the Human Poverty Indices (HPI) provided by the United Nations' Human Development Report (2008). The first assesses poverty in developing nations, and is based on the probability of not surviving to age 40, the adult illiteracy rate, the percentage of people without access to safe water, the percentage of people without access to health services, and the percentage children under five who are underweight. The second assesses poverty in more industrialized nations and is based on the probability of not surviving to age 60, the adult functional illiteracy rate, the percentage of people earning less than 50 per cent of the national median disposable household income, and the percentage of people unemployed for more than a year. According to the United Nations' Human Development Report, it is necessary to use separate indices because poverty is manifested in different ways in developing nations and developed nations: poor people in developed countries have more resources than poor people in developing countries. The former might live on a limited budget, but they typically have access to food, shelter, medical care, and clean water. Poor people in developing countries may lack these necessities.

Since the poverty in developing nations is more severe than the poverty in more industrialized nations in absolute terms, the HPI indices must be interpreted accordingly. Poor people living in developed countries are still better off, in absolute terms, than poor people living in developing countries. In order to reflect this situation, we created a list of the developed countries and ordered them according to their poverty index score (higher numbers for more poverty). We did the same thing for the developing countries. Then we combined the lists, ranking all the developing countries as having higher levels of poverty than all the developed countries. Thus, the combined list indicates a rank of 1 for the developed country with the least poverty (Sweden) and a rank of 59 for the developing country with the most poverty (Zimbabwe). Note that four countries have missing values on this poverty index. We estimated models including and excluding these four countries and the results are the same (Models 3 and 4 in Table IV).

We control for population density (logged), population size (logged), economic growth, and the sex ratio. The measures of population density and size and economic growth were obtained from the Human Development Report. The sex ratio (the number of men per 100 women) was obtained from the Encyclopedia of Global Population and Demographics (Ness and Ciment 1999). It has two missing values.

Table II: Descriptive statistics (Homicide Analysis, $N = 63$ nations)

	Mean	S.D.	Min.	Max.
Homicide rate (log 10)	0.579	0.463	-0.130	1.73
Homicide rate	6.98	9.61	0.74	53.7
Gini index – inequality	38.1	9.2	21.7	59.1
Infant Mortality Rate (log 10)	1.15	0.40	0.55	2.02
Infant Mortality Rate	21.4	20.4	3.55	104.7
Poverty index	29.9	16.7	1	59*
Development index	0.824	0.119	0.51	0.96
Economic growth	0.69	1.97	-7.63	6.19
Sex ratio	96.5	3.6	86.8	106.5
Population density (log 10)	1.90	0.64	0.33	3.76
Population density	298	928	2.14	5754
Population size	30.5	50.6	0.30	299.8

Note:

* Rank goes up to 59 instead of 63 because 4 cases were imputed via Maximization–Expectation.

Table III: Correlation matrix ($N = 63$ nations)

	2	3	4	5	6	7	8	9
1. Homicide rate (log 10)	0.54*	0.68*	0.70*	-0.54*	-0.33*	-0.10	-0.16	0.20
2. Gini – Inequality		0.54*	0.76*	-0.46*	-0.18	0.39*	-0.20	0.08
3. Infant Mortality Rate (log 10)			0.76*	-0.79*	-0.58*	0.04	-0.18	-0.03
4. Poverty index				-0.64*	-0.19	0.33*	0.05	0.01
5. Development index					0.49*	0.18	-0.03	0.17
6. Economic growth						-0.35	0.36*	0.06
7. Sex ratio							0.24	-0.10
8. Population density (log 10)								-0.08
9. Population size								

Note:

* $p < 0.05$.

Results

Descriptive statistics are presented in Table II and a correlation matrix is presented in Table III. The average homicide rate is 6.99 per 100,000, ranging from 0.74 (Japan) to 53.68 (Columbia). The homicide rate is more strongly related to the poverty index ($r = 0.70$) and the infant mortality rate ($r = 0.68$) than to inequality ($r = 0.54$) or economic development ($r = -0.54$), suggesting that poverty is likely to be the most important variable in our multivariate analysis. The poverty measures are related to development ($r = -0.64$ and -0.58) suggesting that the indices tap different but related domains. The poverty index and the infant mortality rate are highly correlated with each other ($r = 0.76$) suggesting that they are both reasonable measures of poverty. Finally, the correlations between income inequality and the poverty measures ($r = 0.76$ for the poverty index; $r = 0.54$ for infant mortality) confirm that nations with high levels of income inequality also have high levels of poverty.

Table IV: OLS regression with Expectation–Maximization for the effects of income inequality and poverty predicting the logged homicide rate (Standard error in parentheses; $N = 63$)

	Model 1		Model 2		Model 3		Model 4	
	b	Beta	B	Beta	b	Beta	b	Beta
Gini – Inequality	0.025* (0.007)	0.489	0.019* (0.006)	0.373	0.004 (0.007)	0.074	0.003 (0.008)	0.058
Development index	–1.31* (0.514)	–0.335	–	–	–	–	–	–
Infant Mortality Rate (Log 10)	–	–	0.626* (0.153)	0.540	–	–	–	–
Poverty Index	–	–	–	–	0.020* (0.004)	0.732	0.021* (0.004)	0.767
Sex ratio	–0.037* (0.015)	–0.287	–0.037* (0.013)	–0.290	–0.041* (0.012)	–0.320	–0.045* (0.013)	–0.329
Economic growth	–0.016 (0.029)	–0.066	0.014 (0.028)	0.061	–0.023 (0.021)	–0.097	–0.017 (0.023)	–0.068
Population density (log 10)	0.031 (0.082)	0.043	0.058 (0.071)	0.081	–0.041 (0.070)	–0.056	–0.061 (0.076)	–0.078
Population size	0.002 (0.001)	0.190	0.001 (0.001)	0.155	0.001 (0.001)	0.157	0.001 (0.001)	0.155
Constant	4.18* (1.32)		2.57* (1.19)		3.84* (1.09)		4.31* (1.19)	
R ²	0.52		0.59		0.65		0.66	

Note:

Expectation–Maximization is used to handle missing data. No missing data on Poverty Index in Model 4 ($N = 59$).

* $p < 0.05$.

We present the results from our multivariate analyses in Table IV. These models are based on equations which include either the development index or different poverty measures. Tests confirmed that multicollinearity did not reach problematic levels ($V.I.F. > 5$) in these analyses.

In Model 1 we estimate the same equation as that estimated by Messner, Raffalovich, and Shrock (2002). The model does not include either measure of poverty. Our results are similar to theirs: Income inequality is positively associated with homicide, controlling for the development index and other national characteristics. In addition, nations that are more economically developed and that have high sex ratios have lower homicide rates.

In Model 2 we substitute the infant mortality rate for the development index. In this model the effect of inequality is weaker (from $b = 0.025$ to 0.019) but remains statistically significant. The infant mortality rate has a strong positive effect on homicide. The standardized coefficient indicates it is the most powerful predictor of homicide in model 2. The other coefficients do not change much.

In Model 3 we substitute the poverty index for the development index and infant mortality. In this equation the coefficient for inequality is close to zero and statistically non-significant. The poverty index, on the other hand, has a substantial positive and statistically significant effect. The standardized

coefficient indicates it is the most powerful predictor of homicide in model 3. Again, the other coefficients do not change much. The results show that poverty is positively associated with homicide, but income inequality is not.

Model 4 is a replication of Model 3, omitting four nations with missing values on the poverty index. Results from Model 4 are almost identical to results from Model 3, confirming that the strong poverty effect and the non-significant effect for inequality are not an artifact of Expectation–Maximization with missing data.

In analyses not presented we examined whether there might be nonlinear (i.e. quadratic) or interactive effects of income inequality. We did not observe any nonlinear relationships or interactions with other variables. We also re-estimated the model with both the development index and the poverty index in the same equation. This analysis had multicollinearity problems but it did reveal a statistically significant poverty effect, but no effect of either inequality or development. We also estimated an equation in which we substituted the Gross Domestic Product (GDP) per capita (World Bank 2001) as a measure of economic development, since some studies use this measure rather than the development index. Its effect was not statistically significant and its inclusion did not have much effect on the coefficients for inequality and poverty.

Finally, we performed some supplementary analyses to address measurement issues related to our poverty index. First, we estimated equations where we substituted actual scores on the poverty indices for rankings, adding the maximum poverty score of developed countries to the poverty score of developing countries. This adjustment reflects the fact that poverty is more severe in developing countries than in developed countries. The results were similar to those presented in Model 4. Second, we analyzed the developed and developing nations separately to address the issue of whether it was appropriate to combine the two poverty indices. The analyses of these subsamples revealed results similar to those we present. For the developed nations, the homicide rate was positively related to the poverty index ($b = 0.025$; $\beta = 0.623$; $p < 0.01$) but unrelated to income inequality ($b = -0.007$; $\beta = -0.097$; $p = 0.529$). For the developing nations, we observed the same pattern ($b = 0.020$; $\beta = 0.401$; $p < 0.05$ for poverty and $b = 0.010$; $\beta = 0.186$; $p = 0.329$ for inequality). Note that any measurement error in this index would tend to make our estimates of poverty effects more conservative and give an advantage to the inequality measure. In other words, if we have misclassified any countries when creating the index, it should weaken the relationship between the poverty index and the homicide rate.

An analysis of ICVS data

We now use the ICVS data to examine the effects of income inequality and poverty on physical assault, robbery, burglary, and theft. The ICVS is hosted by

the United Nations Interregional Crime and Justice Research Institute (UNICRI) 'to provide solid data on crime and victimization for the purpose of international comparison (UNICRI 2005)'. Our analyses are based on nations where a national survey was conducted between 1989 and 2000 (28 of the 58 nations). Nations with capital city surveys or regional surveys are not included because of measurement issues discussed earlier. A list of nations is presented in Appendix I. While the sample size is small, it does not advantage one hypothesis over the other. In addition, it will turn out that the non-significant effects are close to zero suggesting that our results would be similar if we had more statistical power.

Many scholars believe that victimization surveys provide better measures of crime than official data, given that many crimes are not reported to the police (Neapolitan 1997, 2003; Van Kesteren, Mayhew and Nieuwbeerta 2001). In addition, measurement of crime and other variables in the ICVS is standardized: the same questions are asked in every nation. The victimization questions focus on specific behaviours rather than general crime categories (e.g. robbery). This method is better for cross-national comparisons since the meaning of crime categories may vary across nations. Of course, the ICVS also has limitations. For example, there still may be variation across nations in the interpretation of questions about criminal behaviour, or in the willingness of people to take part in the survey and disclose victimization. (For more extended discussions of the merits and limitations of the ICVS, see Block 1993; Neapolitan 1997; Neapolitan 2003; UNICRI 2005; Van Wilsem 2004; Van Kesteren, Mayhew and Nieuwbeerta 2001; Van Dijk 2008).

Measurement

The four dependent variables in this analysis are based on whether the respondent was the victim of physical assault, robbery, burglary, and theft during the last year. Respondents were asked the following questions, and the variables are coded 1 if respondents reported victimization and 0 otherwise:

- (1) 'Have you been personally attacked or threatened by someone in a way that really frightened you, either at home or elsewhere, such as in a pub, in the street, at school, on public transport, on the beach, or at your workplace?'³
- (2) 'Has anyone taken something from you by using force or threatening you or did anyone try to do so?'
- (3) 'Did anyone actually get into your house or flat without your permission, and steal or try to steal something?'
- (4) 'Apart from theft involving force, there are many other types of theft of personal property, such as pickpocketing or theft of a purse, wallet,

clothing, jewelry, sports equipment. This can happen at one's work, at school, in a pub, on public transport, on the beach, or in the street. Have you personally been victim of any of these thefts?"⁴

Our nation level variables are the Gini index, the Poverty index, and the infant mortality rate (log). They are measured in the same way as they were in the homicide analysis. We include the following variables at the individual level: income level, gender, age, frequency of night-time leisure activities outside the home, and the size of the city or town of residence. Income level is treated as a dummy variable coded as either upper 50 per cent or lower 50 per cent (the reference category).⁵ Gender is coded 1 for female and 0 for male. Age is measured with a set of dummy variables, coded as 15–24 (the reference category), 25–34, 35–49, 50 or older, or unknown age. Night-time activity is based on responses to the question 'How often do you personally go out in the evening for recreational purposes, for instance to go to a pub, restaurant, cinema or to see friends?' Answers are coded as either 'Almost everyday', 'At least once a week', 'Less than once a week' (the reference category). The size of the city or town where respondents live is measured with a set of dummy variables coded as either 'Less than 10,000', '10,000–49,999', '50,000–99,999', '100,000–499,999', '500,000 or more' (the reference category). These respondents' individual characteristics are important to control because they are likely to affect the probability of victimization, and because they are likely to be associated with poverty and inequality.

Results

Descriptive statistics are presented in Table V while the multivariate results are presented in Table VI. Equation 1 includes the poverty index while equation 2 includes the infant mortality rate. Equations are estimated using Bernoulli multilevel logistic regression (HLM software version 6).

The results provide no support for the idea that a nation's level of income inequality has a significant effect on any type of crime victimization. None of the coefficients for the Gini index approach statistical significance. It does not matter whether one includes the poverty index or infant mortality in the equation. We do see evidence that the poverty index is positively associated with robbery and burglary and that the infant mortality rate is positively associated with all three property crimes. None of the nation level variables predict assault victimization, however.

We also observe effects of our individual level control variables. Respondents with above the median income are slightly less likely to be assaulted than respondents below the median, but they are slightly more likely to experience theft. Women are less likely to be assaulted or robbed but more likely to

Table V: *Descriptive statistics (ICVS Analysis, N = 122,357 respondents in 28 nations)*

	Mean	S.D.	Min.	Max.
<i>Nation Level</i>				
Gini – Inequality	32.0	6.0	23.1	45.0
Poverty Index	14.5	7.5	1	28
Infant Mortality Rate (log)	0.82	0.19	0.55	1.37
Infant Mortality Rate	7.2	4.2	3.5	23.4
<i>Individual Level</i>				
%				
Assault	1.7			
Robbery	1.3			
Burglary	2.7			
Theft	5.6			
High income (Upper 50%)	43.9			
Low income (Lower 50%)	44.4			
Unknown income	11.7			
Women	54.0			
Men	46.0			
Age 16–24	12.2			
Age 25–34	19.8			
Age 35–49	29.5			
Age 50 +	37.7			
Age Unknown	0.7			
Town/City: Less than 10,000 pop	28.9			
Town/City: 10,000–49,999 pop	21.2			
Town/City: 50,000–99,999 pop	8.4			
Town/City: 100,000–499,999 pop	13.2			
Town/City: 500,000 + pop	12.1			
Town/City: Unknown	16.2			
Evening activities outside home: Daily	9.0			
Evening activities outside home: Weekly	35.9			
Evening activities outside home: Less than weekly	49.2			
Evening activities outside home: Unknown	5.9			

experience theft. Older respondents are less likely to be victims of assault, robbery, or theft. Residents of smaller towns and those who go out less often at night are less likely to experience all four types of victimization. These patterns are consistent with other research (Miethe and Meier 1994; Felson 2002) and therefore provide evidence for the validity of the data.

We also performed aggregate analyses (results not presented). First, we examined bivariate relationships between inequality and crime to see if they were related without controls for poverty. Income inequality was correlated with the robbery rate ($r = 0.49$; $p < 0.05$) and the burglary rate ($r = 0.46$; $p < 0.05$). These coefficients are similar in strength to the correlation between inequality and homicide rates reported in Table III ($r = 0.54$). On the other hand, inequality did not have a significant bivariate relationship with either assault rates ($r = 0.21$; n.s.) or theft rates ($r = 0.14$; n.s.). Second, we examined a multivariate aggregate model. Results were similar to our multilevel analyses, although the effect of the poverty index and the infant mortality rate were slightly stronger for robbery and burglary.

Table VI: Multilevel Bernoulli Logistic Regression predicting the likelihood of crimes (Unstandardized coefficients; Standard error in parentheses; $N = 122,089$ – $122,357$ respondents in 28 nations)

	Assault		Robbery		Burglary		Theft	
	1	2	1	2	1	2	1	2
<i>Nation Level</i>								
Gini – Inequality	0.017 (0.021)	0.021 (0.019)	–0.043 (0.027)	–0.019 (0.011)	0.003 (0.021)	0.015 (0.019)	–0.021 (0.025)	–0.015 (0.019)
Poverty Index	–0.022 (0.015)	– (0.019)	0.049* (0.019)	– (0.015)	0.042* (0.015)	– (0.017)	0.024 (0.017)	– (0.017)
Infant Mortality Rate (log)	– (0.634)	–0.706 (0.634)	– (0.634)	3.00* (0.472)	– (0.472)	1.76* (0.578)	– (0.578)	1.99* (0.653)
<i>Individual Level</i>								
High income	–0.167* (0.052)	–0.158* (0.054)	–0.032 (0.073)	0.040 (0.078)	–0.008 (0.042)	–0.001 (0.046)	0.113* (0.029)	0.111* (0.036)
Women	–0.619* (0.047)	–0.619* (0.047)	–0.401* (0.052)	–0.435* (0.082)	–0.032 (0.036)	–0.032 (0.036)	0.213* (0.026)	0.213* (0.026)
Age 25–34	–0.632* (0.061)	–0.630* (0.061)	–0.758* (0.075)	–0.787* (0.100)	–0.104 (0.062)	–0.104 (0.062)	–0.541* (0.037)	–0.540* (0.038)
Age 35–49	–1.04* (0.063)	–1.04* (0.063)	–0.870* (0.072)	–0.936* (0.112)	–0.042 (0.058)	–0.042 (0.058)	–0.767* (0.037)	–0.766* (0.037)
Age 50+	–1.82* (0.075)	–1.82* (0.075)	–1.17* (0.076)	–1.25* (0.127)	–0.255* (0.059)	–0.253* (0.059)	–1.15* (0.039)	–1.15* (0.039)
Population of Town/City								
Less than 10,000 pop	–0.497* (0.077)	–0.497* (0.077)	–1.02* (0.086)	–1.00* (0.104)	–0.658* (0.059)	–0.660* (0.059)	–0.733* (0.042)	–0.732* (0.042)
10,000–49,999 pop	–0.246* (0.077)	–0.247* (0.077)	–0.599* (0.084)	–0.561* (0.114)	–0.373* (0.059)	–0.374* (0.059)	–0.473* (0.043)	–0.472* (0.043)
50,000–99,999 pop	–0.137 (0.095)	–0.137 (0.095)	–0.594* (0.107)	–0.579* (0.103)	–0.409* (0.076)	–0.411* (0.075)	–0.355* (0.053)	–0.354* (0.053)
100,000–499,999 pop	–0.086 (0.083)	–0.086 (0.083)	–0.268* (0.079)	–0.264* (0.078)	–0.238* (0.064)	–0.238* (0.064)	–0.148* (0.045)	–0.148* (0.045)
Out at Night								
Everyday	0.572* (0.071)	0.576* (0.071)	0.367* (0.081)	0.343* (0.082)	0.245* (0.061)	0.246* (0.061)	0.443* (0.043)	0.443* (0.043)
Once a week	0.221* (0.056)	0.223* (0.056)	0.104 (0.062)	0.084 (0.064)	0.042 (0.042)	0.045 (0.042)	0.270* (0.030)	0.272* (0.030)
Intercept	–3.16* (0.62)	–3.01* (0.551)	–2.29* (0.768)	–4.90* (0.665)	–3.81* (0.607)	–5.08* (0.517)	–1.71* (0.73)	–3.22* (0.572)
Explained Variance	0.099	0.020	0.256	0.482	0.338	0.336	0.062	0.338

Notes:

Reference groups are [Low income, Men, Age 16–24, City 500,000+ pop, Evening activities outside home less than weekly]. Dummy variables for respondents' Unknown age, Unknown income, Unknown town/city size, and Unknown frequency of evening activities outside home are included but not presented.

* $p < 0.05$.

Discussion

Sociologists have a long-standing interest in the negative consequences of inequality (e.g., Neckerman and Torche 2007). One of those consequences, it has been argued, is higher crime rates. Sociological criminologists, however, have largely ignored the study of crimes other than homicide, even though their explanations rely on theories of crime, not theories of homicide.

We argued that there were theoretical reasons to be skeptical that a country's level of income inequality affects its crime rate. We suggested that individuals may not use their compatriots as a reference group, and may not be attuned to the income distribution. We also suggested that equality in a geographic area can imply a concentration of poverty that may lead to more crime, not less. Finally, we cited studies which suggest that violent incidents stems from interpersonal conflicts with adversaries rather than displaced or random aggression. Studies of individual and collective violence do not support the idea that violence reflects irrational outburst produced by free-floating frustration. In sum, violence may be more a response to local circumstances and more proximal contexts.

Our results suggest that income inequality is unrelated to variation in crime across countries, when poverty is controlled. It is unrelated to assault, robbery, burglary, and theft, according to our multilevel analyses of the ICVS. When poverty is adequately controlled, income inequality is also unrelated to homicide rates. Our homicide results are generally consistent with Pridemore's (2008, 2011). We did, however, find that a small effect of inequality remained when we controlled for infant mortality. The difference between our results and Pridemore's is probably due to the effects of our larger sample size. When we include only the nations he studied, we replicate his results.

Our research provides further evidence that the effects of income inequality found in earlier research were due to a failure to control for poverty. We showed that the Gini index reflects the effects of poverty as well as inequality, even when economic development is controlled. The economic development index is a measure of central tendency and was never intended to be a measure of poverty. As stated in a United Nations document:

The human development index measures progress in a community or country as a whole. The human poverty index measures deprivation, the proportion of people in the community who are left out of progress. (United Nation 1998: 25)

We found fairly consistent evidence for the effects of poverty. An individual living in country with high levels of poverty is more likely to be the victim of a homicide, robbery, burglary, and other crimes of theft. We cannot determine whether the relationship between poverty and crime is spurious or reflects a causal effect. If there is a causal effect, we cannot determine whether the effect reflects absolute or relative deprivation. However, we would argue that the assertion of a causal effect for poverty does not require so many questionable assumptions as does an argument that inequality has a causal effect.

We did not find effects of poverty on the risk of physical assault. Citizens are no more likely to become victims of assault when they live in nations with high levels of poverty. It may be that there is not enough variation across country in assault rates to detect a contextual effect. An analysis of the variance

components in the HLM analysis showed that there was much less between-country variation in assault than in the other crimes. Assaults may be more ubiquitous than other offences, committed by a wider range of people. However, there is variation within countries as indicated by the fact that assault victimization is as strongly associated with individual level factors (income, age, urban residence, gender, and routine activities) as are other types of victimization.

Future cross-national research should focus on how to interpret the relationship between poverty and crime. Also, a methodological challenge for future studies is to develop a reliable and standardized index that directly measures the level of poverty across nations. Our study relies on two proxies for poverty, but they each have flaws, so we may be underestimating the true impact of poverty on crime. In addition, it would be useful to collect multi-level data to examine whether individuals with low socio-economic status are more likely to commit crime if they live in areas with high levels of inequality or concentrated poverty. We were not able to adequately examine this statistical interaction with this data set.

In sum, we have questioned whether income inequality leads to crime on both theoretical and empirical grounds. It is interesting that reviews of the literature on inequality and health outcomes have found a similar pattern (e.g. Daly et al. 1998; Lynch et al. 2004). They find that poverty but not income inequality is detrimental to the health of a population. Perhaps the search for inequality effects in the social sciences reflects what Felson (2002) describes as the pestilence fallacy: the tendency to assume that one social evil causes other social evils. There are many reasons why one might want to reduce economic inequality but our results suggest that lowering the crime rate is not one of them.

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Appendix I

(a) List of nations in homicide analysis (N = 63) followed by the infant mortality rate and then poverty index rank. Numbers in italics are model-imputed with Expectation–Maximization. In the analysis the infant mortality rate is logged (Log 10).

Argentina (21.43; 39)	Israel (8.80; 21)	Spain (5.44; 19)
Armenia (28.0; 33)	Italy (6.15; 25)	Sri Lanka (18.50; 57)
Australia (5.61; 17)	Jamaica (20.60; 54)	Sweden (3.53; 1)
Austria (5.29; 8)	Japan (4.19; 13)	Switzerland (5.01; 7)
Azerbaijan (79.50; 35)	Kazakhstan (54.10; 31)	Tajikistan (105.00; 34)
Barbados (14.70; 36)	Korea, Rep. (8.20; 29.4)	Thailand (27.20; 50)
Belgium (5.85; 14)	Kyrgyz Rep. (57.00; 32)	Trinidad-Tobago (31.80; 43)
Brazil (41.89; 49)	Latvia (19.51; 24)	United Kingdom (6.10; 20)
Bulgaria (23.25; 28)	Lithuania (12.32; 26)	United States (7.57; 22)
Canada (5.91; 9)	Luxembourg (5.00; 11)	Uruguay (18.10; 37)
Chile (11.70; 38)	Mauritius (22.30; 52)	Uzbekistan (69.70; 36.1)
Colombia (29.1; 44)	Mexico (28.70; 42)	Venezuela (29.90; 48)
Costa Rica (14.32; 40)	Netherlands (5.36; 3)	Zimbabwe (60.79; 59)
Czech Republic (7.30; 10)	New Zealand (6.70; 18)	
Denmark (5.04; 5)	Nicaragua (39.90; 58)	

Domini. Rep. (41.30; 51)	Norway (4.05; 2)
Ecuador (32.40; 46)	Panama (20.90; 45)
El Salvador (33.00; 55)	Paraguay (36.89; 47)
Estonia (14.64; 27)	Peru (41.90; 53)
Finland (3.87; 4)	Philippines (31.68; 56)
France (4.92; 12)	Poland (12.90; 16)
Germany (5.25; 6)	Portugal (7.43; 21.5)
Hong Kong,* (4.40; 31.2)	Romania (33.59; 29)
Hungary (10.50; 15)	Russian Fed. (23.49; 30)
Ireland (6.37; 23)	Singapore (3.80; 41)

Note:

* Technically not a country. Typically included as a country in previous studies. Results are the same if omitted.

(b) List of nations for ICVS analysis (N = 28) followed by the infant mortality rate and the poverty index rank. Numbers in italics are model-imputed with Expectation–Maximization). In the analysis the infant mortality is logged (Log 10).

Australia (5.61; 12)	Georgia (23.44; 28.0)	Poland (12.9; 15)
Austria (5.29; 8)	Germany (5.25; 6)	Portugal (7.43; 15.6)
Belgium (5.85; 14)	Italy (6.15; 21)	Slovakia (10.5; 16.7)
Canada (5.91; 9)	Japan (4.19; 13)	Slovenia (5.5; 8)
Czech republic (7.30; 10)	Lithuania (12.32; 22)	Spain (5.44; 17)
Denmark (5.04; 5)	Malta (8.13; 16.2)	Sweden (3.53; 1)
England & Wales (6.10; 18)	Netherlands (5.36; 3)	Switzerland (5.01; 7)
Estonia (14.64; 23)	New Zealand (6.70; 16)	USA (7.57; 19)
Finland (3.87; 4)	Northern Ireland (6.37; 20)	
France (4.92; 11)	Norway (4.05; 2)	

Notes

1. In some developing countries people who live in situations of extreme poverty may commit property crime for survival.
2. A random seed is a concept in Monte Carlo simulations to allow the generation of random numbers. Changing the random seeds insures the creation of a new set of random numbers.
3. Slightly different vignettes were used for theft in the 1989 and 1992 surveys, and for burglary in the 1989 survey. The meanings, however, were very similar.
4. Respondents were then asked whether the offender actually attacked them. We only included incidents that culminated in an actual attack; threats alone without an attack were coded 0. However, we replicated the analysis by also coding threats as assaults. The effects of poverty and inequality were the same.
5. This binary measure of income is limited but was the best available measure in the ICVS.

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