Reciprocal Effects of Family Disruption and Crime: A Panel Study of Canadian Municipalities

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Abstract: *Using data of Canadian municipalities in 1996 and 2001, this study examined the reciprocal relationships between divorce, single-parenthood, and crime in both time-lag and simultaneous models. In the time-lag model, the reciprocal effects between percent single-parent families and crime were found to be positive and strong, whereas divorce and crime had negative and weaker reciprocal effects. In the simultaneous model, the reciprocal relationship between crime and single-parenthood remained strong, whereas crime had a unidirectional negative effect on divorce. Altogether, these results have revealed three important findings: the relationship between divorce and crime is negative; divorce and single-parenthood have different and opposite relationships with crime; and crime is an important causal factor of these family variables. Therefore, it is important to differentiate the relationships of divorce and single-parenthood with crime. More importantly, the traditional perspective of crime as just an outcome of family disruption may be inadequate, and one should take into consideration the reciprocal effects.*

Keywords: social disorganization, family disruption, crime, reciprocal effects

In a recent study of social disorganization precursors and crime published in the *Western Criminology Review*, Wong (2007) reported that poverty had significant effects on marriage, divorce, and single-parenthood. Also, poverty was found to have a considerable indirect effect on crime through divorce and single-parenthood. These findings validated the role of family disruption in the explanation of crime. Yet, there are still questions as to whether the relationship between family disruption and crime may in fact be reciprocal. To correctly estimate the effect of family disruption on crime, one may need to take the reciprocal effect into consideration.

The present study examines the reciprocal relationship between crime and family disruption at the municipal level. In this study, the theoretical model poses crime, divorce, and single-parenthood as the outcomes of antecedent structural precursors including poverty, ethnic heterogeneity, and mobility (Shaw and McKay 1942). More importantly, it examines the reciprocal effects between crime and the family variables. The study uses a two-wave panel of 500 Canadian municipalities and examines the reciprocal effects in a simultaneous model as well as a time-lag model. Results from the study differentiate the effect of the family on crime from the effect of crime on the family and provide a more precise and balanced perspective on the role the family plays in crime prevention.

EXPLANATIONS OF THE RECIPROCAL EFFECTS

Sampson (1987a) proposes that the relationship between violent crime and family disruption may be reciprocal. Family disruption weakens the community's formal and informal social control of crime. Crime, in turn, causes the incarceration of males and reduces the availability of marriageable males. Here, a second explanation is added to explain the effect of crime on family disruption. It suggests that the fear of crime causes the exodus of middle-class families and leaves the community with a higher proportion of poor, single-parent and non-traditional families.

The Effect of Family Disruption on Crime

Sampson (1987a) notes that at the community level, family and marital disruption may affect crime and

delinquency for three reasons. First, individuals from unstable families or single-parent families tend to have higher rates of involvement in crime and delinquency. Second, a substantial number of disrupted families in the community may reduce participation in and support for formal organizations and eventually weaken the community's formal social control mechanism. Third, disrupted families are less able to contribute to the community's informal social control mechanism with respect to watching out for strangers, watching over properties in the neighborhood, supervising youths, and intervening in local disturbances. Sampson and Groves (1989) add that family disruption also causes sparse local friendship networks. Furthermore, family disruption may cause resource depletion and perceived powerlessness, thus contributing to the weakening of collective efficacy in the community (Sampson, Raudenbush, and Earls 1997).

The Effect of Crime on Family Disruption

Two explanations of the effect of crime on family disruption, the "fear of crime" explanation and the "incarceration of male offenders" explanation, are discussed here. High crime rates and the fear of crime in the community may deter new residents from moving in and cause a corresponding exodus of families who can afford to move out (Kubrin and Weitzer 2003; Liska and Warner 1991; Skogan 1986; South and Messner 2000). Consequently, the proportion of middle-class, traditional and two-parent families decreases, and the proportion of poor, non-traditional and single-parent families increases. At the community level, the effect of crime on the proportion of disrupted families is thus explained by the fear of crime, the abated socioeconomic status of the area, and the subsequent migration pattern.

Crime may lead to the incarceration of offenders, especially male offenders, thus causing the coerced mobility of men and fathers and reducing the number of eligible domestic partners (Clear et al. 2003; Lynch and Sabol 2004; Meares 2004; Rose and Clear 1998; Sampson 1987a; Sampson and Laub 1992; South and Messner 2000). The incarceration of offenders who are also parents or providers for the family may also weaken family cohesion and reduce family financial resources (Clear et al. 2003; Hagan and Dinovitzer 1999; Hallett 2002; Kubrin and Weitzer 2003). As a result, it becomes more difficult for some of the members in the community to maintain existing domestic unions or form new ones. These negative effects of incarceration explain the aggravating effects of crime on the family.

Family Disruption, Single-Parenthood and Divorce

While Sampson (1987a) pioneered the study of family disruption as an explanation of crime, he has not provided a clear definition of the concept. Nonetheless, based on

Sampson's (1987a) and Shihadeh and Steffensmeier's (1994) theoretical discussions, one may derive the general notion that family disruption involves critical changes in the family structure and circumstances that have the potential of weakening its social control functions. In addition to divorce and single-parenthood, the list of disruptive changes and circumstances may include, but is not limited to, nonmarriage, early marriage, early childbearing, nonmarital birth, separation, foster parenting, parental absenteeism, widowhood, and death (see, for example, McLanahan and Bumpass 1988; Messner and Sampson 1991).

As much as Sampson considers both female-headship and divorce indicators of family disruption (see, Sampson 1987a; Sampson and Groves 1989), these variables are representative of different aspects of family disruption. Single-parenthood involves the formation or restructuring of the parent-child relationship, particularly involving minor children, whereas divorce involves the legal dissolution of the spousal relationship, which may or may not involve children. For example, in Canada, only about 35% of the divorces in 2003 involved dependent children (Human Resources and Skills Development Canada 2010). Also, studies have found a strong association between socioeconomic disadvantage and single-parenthood (see, for example, Browning, Feinberg, and Dietz 2004; Hannon and DeFronzo 1998; Kubrin and Wadsworth 2003; Sampson et al. 1997), whereas there is some evidence that divorce is positively associated with women's employment status (Boyle et al. 2008; Greenstein 1990; South 2001). Therefore, it is reasonable to expect that compared to divorce, single-parenthood has a stronger effect on crime.

Regarding the effect of crime on family disruption, since the "fear of crime" explanation focuses on the out-migration of middle class families and the relative immobility of poor and single-parent families, one may expect that crime has a stronger effect on single-parenthood than it does on divorce.

RESEARCH ON THE RECIPROCAL EFFECTS

Research on the Effect of Family Disruption on Crime

Based on data from the British Crime Survey in 1982, Sampson and Groves (1989) measured family disruption as a combined index of marital separation, divorce, and single-parenthood, and they found that family disruption increased the rates of robbery, stranger violence, burglary, auto-theft, and theft/vandalism. In a replication of the aforementioned study, Veysey and Messner (1999) confirmed that family disruption had a positive effect on crime. In another replication, Lowenkamp, Cullen, and Pratt (2003) reported the finding of an effect comparable to that reported by Sampson and Groves (1989). The

proposed effect of family disruption on crime and delinquency also claimed support from a number of other studies (Frye and Wilt 2001; Weisheit and Wells 2005; Wells and Weisheit 2004).

Research on the Effect of Single-Parenthood on Crime

A number of studies have reported statistical positive effects of single-parenthood on homicide rates. Sampson observed that percent two-parent households reduced homicide offending for blacks (Sampson 1986), and the percentage of black households headed by women had a positive effect on black juvenile homicide rate (Sampson 1987a). Supportive findings have also been reported in studies of black and white murder rates (Messner and Sampson 1991), black juvenile homicide (Shihadeh and Steffensmeier 1994), white homicide rates (Parker and Johns 2002), and American Indian homicide (Lanier and Huff-Corzine 2006). Regarding gender-specific homicide rates, a few studies found causal links between female-headship and uxoricide victimization (Wilson, Daly, and Wright 1993), female and male homicide rates (Schwartz 2006a; Schwartz 2006b; Steffensmeier and Haynie 2000) and male homicide offending (Lee and Stevenson 2006).

The proposed effect of single-parenthood has also been observed in studies of other types of crime. In various studies, Robert Sampson reported positive effects of female-headship on personal theft and violent victimizations (Sampson 1985), single-adult households on burglary victimization (Sampson 1987b) and black female-headship on both juvenile and adult robbery rates (Sampson 1987a). Also reported was a negative effect of percent two-parent households on robbery offending (Sampson 1986). A fair number of studies have established the expected causal links between single- or female-headship and burglary (Andresen 2006; Smith and Jarjoura 1989), robbery (Messner and Sampson 1991; Shihadeh and Steffensmeier 1994), youth crime and violence (Osgood and Chambers 2000; Ouimet 2000), and various other measures of crime (Freisthler 2004; Krivo and Peterson 1996; Rice and Smith 2002; Schulenberg, Jacob, and Carrington 2007; Wong 2007).

Research on the Effect of Divorce on Crime

Several studies have reported a statistical positive effect of divorce on crime. Sampson (1986) reported positive effects of the divorce rate on the robbery and homicide rates. A number of other studies also reported positive effects of the divorce rate on various measures of homicide, including the homicide rate (Koski 1996; Matthews, Maume, and Miller 2001; Phillips 2006; Rosenfeld, Messner, and Baumer 2001), justifiable homicide (MacDonald and Parker 2001), white homicide (Parker and Johns 2002), adult and juvenile homicide (Lee and Bartkowski 2004; MacDonald and Gover 2005), male

homicide offending (Lee and Stevenson 2006), and serial homicide (DeFronzo et al. 2007). With respect to divorce and other types of crime, supportive findings were reported for robbery and assault (Sun, Triplett, and Gainey 2004) and drug arrests (Parker and Maggard 2005). On the other hand, a few studies did not find the proposed effect of divorce on crime (Kubrin 2003; Lee and Ousey 2005; Messner, Baumer, and Rosenfeld 2004; Rosenfeld, Baumer, and Messner 2007; Schwartz 2006b; Wong 2007).

Based on the above review, one may reasonably conclude that while a majority of the studies have found a positive effect of divorce rate on crime, there are a number of studies reporting nonsignificant effects. To that extent, the effect of divorce on crime may not be as strong and stable as that of single-parenthood.

Research on the Effect of Crime on Family Disruption

Existing research on the effects of crime on family disruption has been rather inadequate in providing direct supportive evidence. In his examination of the reciprocal effects between black female-headship and a combined measure of black homicide and robbery, Sampson (1987a) found that the effect of violence on family disruption was statistically not significant at the .05 level. Similarly, Shihadeh and Steffensmeier (1994) found that the effect of violence, a composite measure based on adult and juvenile homicide and robbery, on family disruption was statistically not significant.

Given the shortage of existing studies, we have to rely much on related studies that may at least indirectly shed some light on the subject. There have been a number of studies suggesting that delinquency causes poor parenting (Reitz et al. 2006; Stewart et al. 2002), weakens parental attachment, parental supervision and school attachment (Patchin et al. 2006; Thornberry 1987; Thornberry et al. 1991), and increases family risks (Beaver and Wright 2007). Here, we may regard these studies as some support of the notion that crime and delinquency is potentially a source of strain on the family.

In support of the fear of crime argument, studies have found a connection between fear of victimization and robbery and stranger assault (Bellair 2000) and a connection between neighborhood disorder and crime perception (McCrea et al. 2005; Ross and Jang 2000). In addition, a number of studies have found the proposed connection between collective efficacy and a number of crime and disorders including violent crime (Sampson and Raudenbush 1999), property crime (Cancino 2005), and perceived crime (Duncan et al. 2003; Saegert and Winkel 2004).

On the other hand, contrary to the fear of crime perspective, some studies have found evidence that crime may actually help to strengthen the solidarity of the community, thus supporting instead a classic Durkheimian

perspective of crime and societal response (Durkheim 1966). Studies have shown that crime strengthened community organization (Skogan 1989), attachment and involvement of the residents (Taylor 1996), social activism (Messner et al. 2004), and neighborhood's efforts in crime prevention (Pattavina, Byrne, and Garcia 2006). These results suggest that crime may not necessarily compromise the collective well-being of the community.

Quite contrary to the incarceration argument, some studies found that incarceration reduced crime (Sampson 1986) and that incarceration did not affect family structure (Phillips et al. 2006). These findings cast doubts on the argument that incarceration is harmful to the community or causes family disruption.

Based on the above review, it is reasonable to conclude that crime probably has some effect on family disruption. Yet, the effect is likely weak, and the proposed causal links through the fear of crime and incarceration have only limited empirical support.

The Effects of Social Disorganization Precursors on Family Disruption and Crime

Building on social disorganization theory (Shaw and McKay 1942), the theoretical model here posits that poverty, mobility, and heterogeneity increase the likelihood of divorce, single-parenthood, and crime (see also, Wong 2007). A concentration of low income and unemployed males may reduce the number of marriageable males and increase the likelihood of family disruption (Sampson 1987a; Wilson 1987). A number of research studies have found considerable associations between various measures of poverty and family disruption (Breault and Kposowa 1987; Figueira-McDonough 1995; Hewitt, Baxter, and Western 2005; Messner and Sampson 1991; Shihadeh and Steffensmeier 1994; Stokes and Chevan 1996; Wong 2007). Regarding the effect of poverty on crime, poverty depletes the community's resources, reduces its capacity to meet its members' basic needs, and reduces its ability to monitor and control criminal activities, thus eventually causing crime and delinquency to increase (Bachman 1991; Hannon and Defronzo 1998; Krivo and Peterson 1996; Lee and Stevenson 2006; MacDonald and Gover 2005; Matthews et al. 2001; Nieuwbeerta et al. 2008; Oh 2005; Parker and Johns 2002; Peterson, Krivo, and Harris 2000; Sampson and Groves 1989; Strom 2007; Wilson 1987).

A high degree of population mobility may adversely affect the stability of friendship and kinship ties (Sampson 1987c) and the formation and maintenance of marital and conjugal relationships (see, for example, Glenn and Shelton 1985; Jacobsen and Levin 1997; Myers 2000; Shelton 1987; South and Lloyd 1995; Trovato 1986; Wong 2007). Mobility may contribute to divorce or separation (Finnäs 1997; Glenn and Shelton 1985; Shelton 1987;

South and Lloyd 1995; Trovato 1986; Wong 2007) and single-parenthood (Tolnay and Crowder 1999). Also, mobility may cause crime by increasing instability, straining resources to deal with the settlement of new members, and weakening social networks in the community (Clear et al. 2003; Hannon and DeFronzo 1998; Hartnagel 1997; Haynie and Armstrong 2006; Kubrin 2003; Lanier and Huff-Corzine 2006; Lee and Martinez 2001; Osgood and Chambers 2000; Peterson et al. 2000; Renauer et al. 2006; Sampson et al. 1997; Schulenberg et al. 2007; Sun et al. 2004; Weisheit and Wells 2005; Welsh, Stokes, and Greene 2000; Wong 2007).

Heterogeneity, combined with a certain degree of segregation or fragmentation between the different groups, may deplete social capital, reduce political participation, and weaken the ability of the community to organize itself (Costa and Kahn 2003; Rotolo 2000). The community is thus less able to provide supports and services to the family. Also, different beliefs, values, ideas, and practices regarding marriage and the family (McLoyd et al. 2000) may weaken the community's consensus. Studies have found associations between racial or ethnic minority groups and female-headship (Sampson 1987a; Shihadeh and Steffensmeier 1994; Stokes and Chevan 1996) and divorce (Breault and Kposowa 1987). Also, differences in cultural backgrounds, language barriers, and inter-ethnic tension and conflict may cause weaker social networks, less supervision of youths, weaker social control, and eventually more crime and delinquency (Flippen 2001; Green, Strolovitch, and Wong 1998; Hansmann and Quigley 1982; Hirschfield and Bowers 1997; Sampson et al. 1997; Schulenberg et al. 2007; Smith and Jarjoura 1988; Strom 2007; Sun et al. 2004; Veysey and Messner 1999; Walsh and Taylor 2007; Weisheit and Wells 2005; Wong 2007).

The Theoretical Model

In short, based on the above review of theory and research, the theoretical model proposes that poverty, mobility, and heterogeneity have positive effects on divorce, single-parenthood, and crime. It further proposes that divorce, single-parenthood, and crime have reciprocal effects on one another. Population size, population density, and sex ratio (Guttentag and Secord 1983; Messner and Sampson 1991) are incorporated in the model as statistical control variables. In the analysis, a time-lag model is used to ascertain chronologically the cause and effect relationships, and the reciprocal effects are examined in both the time-lag model and a proposed simultaneous model.

METHODOLOGY

The Data

The present study combined municipal crime rates from the Canadian Uniform Crime Report (UCR) (Canadian Center for Justice Statistics 2002a) and selected data from the 2001 Census and the 1996 bi-Census. Data from 500 Canadian municipalities were available for analysis, with a total of 1.94 million reported Criminal Code offenses in 1996 and 1.92 million offenses in 2001, representing 73% and 80% of all reported offenses in the respective years (for the corresponding UCR statistics, see Canadian Center for Justice Statistics 2002b).

The Variables

Information on the crime rates was compiled from Statistics Canada's electronic data files and an annual publication, entitled *Crime and Police Resources in Canadian Municipalities*, based on data collected from the Police Administration Annual Survey and the UCR Survey (see, for example, CCJS 2002a). Three aggregated rates, violent, property, and total crime rates, based on the number of incidents reported to the police per 100,000 population, were used in this study. The total crime rate included violent, property, and other Criminal Code offenses, including mischief, disturbing the peace, bail violation, counterfeiting currency, offensive weapons, arson, prostitution, and other offenses excluding traffic offenses (Savoie 2002). Based on municipal-level data, the total crime rate showed a decline from an average of 9,942 offenses per 100,000 population in 1996 to 9,017 offenses in 2001 (see Table 1).

The municipal average total crime rate in 2001 appeared substantially higher than the national average of 7,747 offences per 100,000 population (Savoie 2002) probably due to the higher rates in smaller municipalities.[1] To determine the sample's representativeness, I calculated the total crime rate weighted by the municipal population size and yielded an average of 8,044 offenses per 100,000, compared to 7,747 for the nation ($t = 1.85$, n.s.; weighted statistics not shown in tables). The sample proportion of violent crime was 12.3%, similar to a national proportion of 12.8% (see Savoie 2002) ($t = -.33$, $df = 499$, n.s.). The sample proportion of property crime was 55.6%, not statistically significantly different from a national proportion of 52.2% (see Savoie 2002) ($t = 1.52$, $df = 499$, n.s.). Based on these comparisons, one may conclude that the present sample was reasonably representative of the nation.

Population size was based on the census enumeration of the number of persons in the municipality. The average population size of the municipalities in 1996 was approximately 40,936 (see Table 1). Population density in 1996 was about 647 persons per square kilometer. Both population size and population density were transformed by a logarithmic function to deal with data skew and outliers.

Low income was measured as the percentage of low-income families in the municipality (Matthews et al. 2001; Osgood and Chambers 2000; Warner and Pierce 1993). The definition of low income was based on Statistics Canada's low-income cut-offs (see Paquet 2002; Statistics Canada 2003). In 1996, the average percentage of low-income families for the municipalities was 14.05% (see Table 1), somewhat lower than but not significantly different from the national rate of 16.28% in 1996 (Statistics Canada 2009a; $t = -1.35$, $df = 499$, n.s.).

Mobility was measured as the percentage of "movers" or persons one year of age or older in the municipality who had lived at a different address one year earlier. The average percentage of movers in the municipalities in 1996 was close to 16.62% (see Table 1), compared to a national proportion of 15.46% (see Statistics Canada 2009b). While a number of studies used a five-year time frame (see for example, Kubrin 2003; Lanier and Huff-Corzine 2006; Schwartz 2006a), I elected to limit the mobility measure to a one-year time frame for two reasons. First, the five-year measure included a fair proportion of persons who had not moved since up to five years, thus representing a few years of stability instead of mobility. Second, one-year mobility correlated more strongly with crime ($r_{4,9} = .57$; see Table 2) than did five-year mobility ($r = .43$; not shown in tables). Moreover, the partial correlation between five-year mobility and crime became negative (partial $r = -.10$) after controlling for one-year mobility. In contrast, the partial correlation between one-year mobility and crime remained strong (partial $r = .42$), even after controlling for five-year mobility (results for the partial correlations not shown in tables).

Ethnic heterogeneity was a composite variable based on multiple categories of ethnic identity (Statistics Canada 2003). The data used here were collected from Statistics Canada's E-Stat tables of population profiles (Statistics Canada 2009c).[2] Blau's (1977) index was used here to measure the degree of ethnic heterogeneity (see also Hirschfield and Bowers 1997; Osgood and Chambers 2000; Sampson and Groves 1989; Smith and Jarjoura 1989; Sun et al. 2004; Veysey and Messner 1999; Warner and Pierce 1993; Weisheit and Wells 2005; Wong 2007). The index was constructed as ($1 - \Sigma p_i^2$), with p_i representing the proportion of an ethnic group relative to the population.[3] Here, the heterogeneity index had a value of 0.55 in 1996.

Sex ratio was measured here as the number of males per 100 females, both aged between 15 and 54. The age criterion was imposed to increase the relevance to related variables including divorce, percent single-parent families, and crime (see Messner and Sampson 1991; Rolison 1992; South and Lloyd 1995; Trent and South 1989). In 1996,

Table 1. *Basic Statistics of the Variables (N = 500).*

Variable	Mean	S.D.
1996		
Population Size	40,936.00	144,258.98
Log. Population Size	9.32	1.39
Population Density	647.23 / sq. km.	671.32
Log. Population Density	5.96	1.21
%Low Income Families	14.05%	5.37
Population Mobility	16.62%	4.99
Ethnic Heterogeneity	.55	.10
Sex Ratio	98.85 males / 100 females	5.98
%Divorced (DVR1)	7.42%	2.21
%Single-Parent Families (SPF1)	14.40%	4.47
Total Crime Rate (TCR1)	9,942.28 / 100,000	5,463.28
Violent Crime Rate (VCR1)	1,090.26 / 100,000	916.68
Property Crime Rate (PCR1)	5,153.77 / 100,000	2,552.61
2001		
%Divorced (DVR2)	8.05%	2.38
%Single-Parent Families (SPF2)	15.39%	4.07
Total Crime Rate (TCR2)	9,016.78 / 100,000	5,507.83
Violent Crime Rate (VCR2)	1,099.38 / 100,000	888.54
Property Crime Rate (PCR2)	4,094.27 / 100,000	2,014.35

the sex ratio for the sample was 98.85 (see Table 1), close to the ratio of 99.26 for the nation (Statistics Canada 2009d).

Percent population divorced referred to the percentage of persons aged 15 or over identified as divorced in the current year. The average percentage of divorced population for the municipalities increased from 7.42% in 1996 to 8.05% in 2001 (Table 1), quite comparable to the national proportions of 7.19% and 7.64% in the respective years (Statistics Canada 2009d, 2009e). The average percentage of single-parent families also increased over the years from 14.40% in 1996 to 15.39% in 2001 (Table 1), thus resembling the national proportions of 14.51% and 15.66% in the respective years (Statistics Canada 2009d, 2009e).
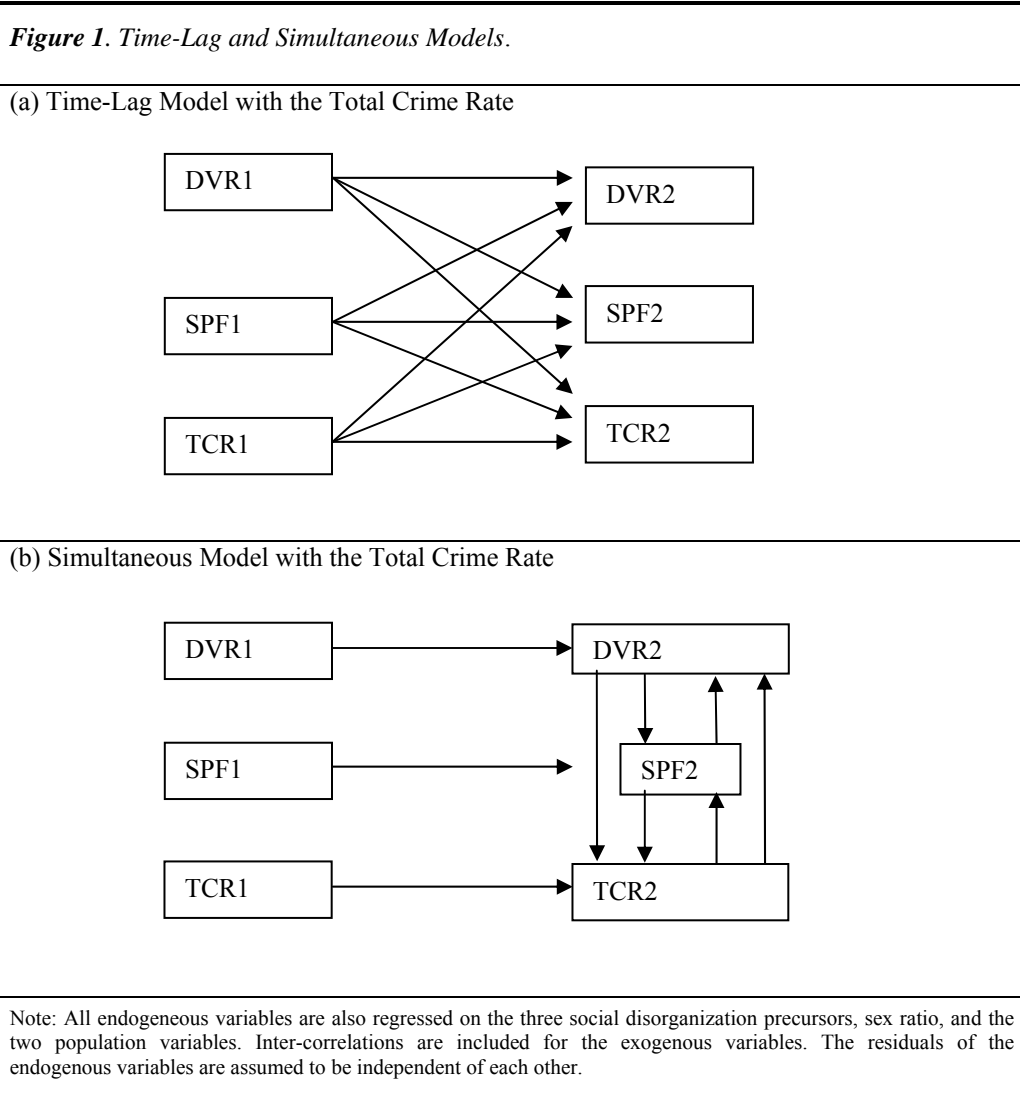
Based on the comparisons between the present sample and the national data in terms of the crime rates, percent low income families, mobility, the sex ratio, divorce rate, and percent single-parent families, one may conclude that the present sample was reasonably representative of the Canadian population in the aforementioned characteristics.

Analytical Models and Statistical Methods

In the present study, a time-lag causal model and a simultaneous reciprocal model were used to estimate the effects of the major variables (for discussions of the reciprocal model, see Sampson 1987a; Shihadeh and Steffensmeier 1994). In the time-lag causal model, each of the endogenous variables in Time 2 including divorce,

single-parenthood, and crime was regressed on their counterparts in Time 1 plus the three social disorganization variables, sex ratio, and the two population variables in Time 1 (see Figure 1a). For example, Time 2 divorce was regressed on Time 1 divorce, single-parenthood, and the total crime rate, plus the social disorganization and statistical control variables (see column 3a in Table 3). Given that the causal paths were all recursive, estimates were obtainable by the multiple-regression method using

the ordinary least squares (Allison 1999). Three regression equations were used for the causal relationships involving the total crime rate (see columns 3a to 3c in Table 3). Similarly, the violent and property crime rates each also required three regression equations (see columns 3d to 3i in Table 3). The time-lag model estimated the effects of the family variables and the crime rates on each other across time.

Figure 1. *Time-Lag and Simultaneous Models*.

(a) Time-Lag Model with the Total Crime Rate

(b) Simultaneous Model with the Total Crime Rate

Note: All endogenous variables are also regressed on the three social disorganization precursors, sex ratio, and the two population variables. Inter-correlations are included for the exogenous variables. The residuals of the endogenous variables are assumed to be independent of each other.

In the simultaneous reciprocal model, each of the endogenous variables in Time 2 including divorce, single-parenthood, and crime was regressed on the other endogenous variables and its counterpart in Time 1, plus the three social disorganization variables, sex ratio, and the two population variables in Time 1 (see Figure 1b). For example, Time 2 divorce was regressed on single-

parenthood and the total crime rate in Time 2, while controlling for divorce and the social disorganization and statistical control variables in Time 1 (see column 4a in Table 4). Structural equation modeling (SEM) with the maximum likelihood estimation (MLE) was used to estimate the simultaneous reciprocal effects (Hayduk 1987; Jöreskog 1979). A SEM software, AMOS (version

4.0), was used for the computation (Arbuckle and Wothke 1999). Three simultaneous structural equations specified the causal relationships involving the total crime rate (see columns 4a to 4c in Table 4). Also specified in the model were the inter-correlations between the exogenous variables. The residual terms associated with the endogenous variables were assumed to be independent of each other. A similar SEM approach was used for the violent and property crime rates (see columns 4d to 4i in Table 4). The simultaneous model estimated the reciprocal effects between the family variables and the crime rates in Time 2, while controlling for the effects of the variables in Time 1.

RESULTS

The bivariate correlations of the variables are presented in Table 2. Strong correlations were observed between low income and percent single-parent families (i.e., $r_{3,8}$ = .72 and $r_{3,13}$ = .68). These high correlations would call for the examination of possible collinearity-related problems in subsequent analyses. Regarding the correlations between the family variables and crime, divorce had weak correlations with total and violent crime (i.e., $r_{7,9}$ = .06 and $r_{7,10}$ = -.05 in 1996; and, $r_{12,14}$ and $r_{12,15}$ were both -.07 in 2001) and weak to moderate correlations with property crime (i.e., $r_{7,11}$ = .23 and $r_{12,16}$ = .09 in 1996

and 2001, respectively). In comparison, the correlations between percent single-parent families and the crime rates were much higher (i.e., $r_{8,9}$, $r_{8,10}$ and $r_{8,11}$ were between .30 and .38 in 1996; and $r_{13,14}$, $r_{13,15}$ and $r_{13,16}$ were between .42 and .45 in 2001). Thus, with respect to their associations with crime, divorce and percent single-parent families behaved quite differently. These correlations supported the need to differentiate their relationships with crime.

The correlations between sex ratio and the family and crime variables were mostly negative, with the largest coefficients observed between sex ratio and percent single-parent families ($r_{6,8}$ = -.30 in 1996; see Table 2). These correlations suggested that, in municipalities where men outnumbered women, there were lower rates of divorce, single-parent families, and crime. The negative correlations with crime were quite unexpected ($r_{6,9}$ = -.09, $r_{6,10}$ = -.02 and $r_{6,11}$ = -.14). To clarify the rather unexpected association, possibly caused by the indirect effect of sex ratio on crime through percent single-parent families (see Guttentag and Secord 1983; Messner and Sampson 1991), I estimated the partial correlations between sex ratio and the crime rates in 1996, controlling for percent single-parent families. Indeed, the subsequent observed partial correlations became near zero or positive (partial r's were .02, .08 and -.03 with total, violent, and property crime, respectively; results not shown in tables).

Table 2. *Correlations of Variables (N = 500).*

Variable	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) Log. Population Size	.30	.24	.07	.31	-.17	.33	.25	.01	-.11	.23	.26	.20	-.09	-.15	.15
(2) Log. Population Density		.22	.21	.14	-.34	.19	.25	.11	-.09	.25	.13	.19	.09	-.03	.23
(3) % Low Income Families			.18	-.11	-.25	.39	.72	.23	.22	.26	.35	.68	.20	.22	.26
(4) Mobility				.30	.06	.15	.25	.57	.40	.57	.07	.30	.58	.48	.59
(5) Ethnic Heterogeneity					.03	-.13	-.09	.38	.28	.41	-.19	-.06	.38	.31	.42
(6) Sex Ratio						-.07	-.30	-.09	-.02	-.14	-.07	-.25	-.05	.01	-.11
(7) % Divorced (DVR1)							.51	.06	-.05	.23	.95	.41	-.01	-.04	.17
(8) % Single-Parent Fam. (SPF1)								.37	.30	.38	.47	.81	.33	.34	.36
(9) Total Crime Rate (TCR1)									.80	.87	-.02	.42	.84	.73	.78
(10) Violent Crime Rate (VCR1)										.55	-.11	.39	.76	.78	.57
(11) Property Crime Rate (PCR1)											.15	.39	.69	.52	.82
(12) % Divorced (DVR2)												.41	-.07	-.07	.09
(13) % Single-Parent Fam. (SPF2)													.43	.45	.42
(14) Total Crime Rate (TCR2)														.90	.87
(15) Violent Crime Rate (VCR2)															.67
(16) Property Crime Rate (PCR2)															

Time-Lag Effects

The regressions of the dependent variables in Time 2, including the divorce rate (DVR2), percent single-parent families (SPF2), the total crime rate (TCR2), the violent crime rate (VCR2), and the property crime rate (PCR2) on the predictors in Time 1 are presented in Table 3. Population size and density showed some negative effects on the divorce rate ($\hat{\beta}_{12,1(3a)} = -.06$ and $\hat{\beta}_{12,2(3a)} = -.03$; see column 3a in Table 3). Mobility also had a negative effect on divorce ($\hat{\beta}_{12,4(3d)} = -.04$; see column 3d). These effects suggest that favorable economic conditions associated with the larger, booming, and potentially more resourceful municipalities may somewhat reduce divorce. Percent single-parent families in Time 1 had a positive effect on Time 2 divorce ($\hat{\beta}_{12,8(3a)} = .05$).[4] On the other hand, the total and violent crime rates in Time 1 had unexpected negative effects on Time 2 divorce rate ($\hat{\beta}_{12,9(3a)} = -.06$ and $\hat{\beta}_{12,10(3d)} = -.06$), suggesting that crime may actually reduce family dissolution.[5]

The regression of Time 2 percent single-parent families on the various Time 1 predictors identified several statistically significant effects (see Table 3). Percent low income, mobility, and the total crime rate in Time 1 had positive effects on Time 2 percent single-parent families ($\hat{\beta}_{13,3(3b)} = .20$, $\hat{\beta}_{13,4(3e)} = .08$ and $\hat{\beta}_{13,9(3b)} = .15$, respectively).[6] On the other hand, ethnic heterogeneity had a negative effect on single-parenthood ($\hat{\beta}_{13,5(3b)} = -.06$), perhaps reflecting the more traditional perspective of certain ethnic minorities, especially immigrant groups, towards marriage and the family. Also quite unexpectedly, the effect of percent divorced population on single-parenthood was almost zero ($\hat{\beta}_{13,7(3b)} = .01$).[7]

Table 3. *Time-Lag Effects of the Variables (N = 500).*

		3a	3b	3c	3d	3e	3f	3g	3h	3i
	Regressor	(12) DVR2	(13) SPF2	(14) TCR2	(12) DVR2	(13) SPF2	(15) VCR2	(12) DVR2	(13) SPF2	(16) PCR2
(1)	Log. Population Size	-.06***	.03	-.16***	-.06***	.04	-.18***	-.05**	-.00	-.08**
(2)	Log. Population Density	-.03*	-.04	-.01	-.04**	-.02	-.02	-.03	-.06	.02
(3)	% Low Income Families	-.03	.20***	.02	-.03	.18***	-.01	-.03	.20***	.04
(4)	Mobility	-.03	.06	.15***	-.04*	.08**	.17***	-.04*	.09**	.16***
(5)	Ethnic Heterogeneity	-.01	-.06*	.14***	-.01	-.06*	.17***	-.02	-.03	.14***
(6)	Sex Ratio	-.02	-.02	.01	-.01	-.03	.04	-.02	-.03	-.01
(7)	% Divorced (DVR1)	.97***	.01	-.07*	.96***	.02	-.07*	.97***	-.01	-.02
(8)	% Single-Parent Fam. (SPF1)	.05*	.59***	.13**	.05*	.58***	.24***	.04	.63***	.08
(9)	Total Crime Rate (TCR1)	-.06**	.15***	.66***	---	---	---	---	---	---
(10)	Violent Crime Rate (VCR1)	---	---	---	-.06***	.16***	.57***	---	---	---
(11)	Property Crime Rate (PCR1)	---	---	---	---	---	---	-.03	.07*	.65***
	R^2	.91	.70	.75	.91	.71	.69	.91	.70	.71

<u>Note</u>: Only standardized coefficients are presented.

*$p < .05$; **$p < .01$; ***$p < .001$.

The regressions of divorce and single-parenthood revealed that these family variables related to the predictors in quite different manners. For example, population size and density reduced divorce whereas ethnic heterogeneity reduced percent single-parent families. Low income, crime, and mobility increased percent single-parent families but not divorce. Therefore, while single-parenthood was a product of certain unfavorable social and economic conditions, divorce was less susceptible to those same conditions.

Consistent with social disorganization theory, the regressions of Time 2 crime rates showed that mobility, ethnic heterogeneity, and percent single-parent families contributed to a higher total crime rate ($\hat{\beta}_{14,4(3c)} = .15$, $\hat{\beta}_{14,5(3c)} = .14$ and $\hat{\beta}_{14,8(3c)} = .13$, respectively). In addition, the effect of single-parenthood was more pronounced for violent crime than property crime ($\hat{\beta}_{15,8(3f)} = .24$ compared to $\hat{\beta}_{16,8(3i)} = .08$).

The observed effect of Time 1 divorce on Time 2 total crime rate was negative and statistically significant ($\hat{\beta}_{14,7(3c)} = -.07$). While it was predicted that divorce, as a

measure of family disruption, should contribute to an increase in crime, the observed effect suggested an outcome quite opposite to the prediction. Even more intriguing is the observed negative effect of divorce on the violent crime rate ($\hat{\beta}_{15,7(3f)} = -.07$). This finding calls for the need to rethink whether family disruption such as divorce should necessarily be representative of structural disorganization in the community.[8]

The family variables and crime had significant time-lag reciprocal effects on one another. A closer examination revealed that the reciprocal effects involving divorce were negative and weak (with $\hat{\beta}_{12,9(3a)} = -.06$ and $\hat{\beta}_{14,7(3c)} = -.07$ involving TCR). On the other hand, the reciprocal effects involving percent single-parent families were positive and stronger (with $\hat{\beta}_{13,9(3b)} = .15$ and $\hat{\beta}_{14,8(3c)} = .13$ involving TCR).

Thus far, the results involving the time-lag reciprocal effects pointed to at least two tentative conclusions. First, given the statistically significant reciprocal effects, one may conclude that previous studies that did not control for the reciprocal effects might have overestimated the effect

of the family variables on crime. Second, the results showed that divorce and single-parenthood had very different effects on crime. Therefore, studies that did not differentiate their effects accordingly might have overlooked the quite probable crime reduction effect of divorce as opposed to the crime causing effect of single-parenthood. By combining divorce and single-parenthood in a composite measure of family disruption, those studies found only a weak effect of family disruption on crime (see for example, Sampson 1987a; Shihadeh and Steffensmeier 1994) and failed to capture the separate and different effects.

Simultaneous Reciprocal Effects

A simultaneous model using SEM was used here to estimate the reciprocal effects among divorce, percent single-parent families, and crime in Time 2 (see Table 4). The observed reciprocal effects between percent single-parent families and the crime rates in Time 2 were statistically significant. Percent single-parent families had

Table 4. *Simultaneous Effects of the Variables (N = 500).*

	4a	4b	4c	4d	4e	4f	4g	4h	4i
	(12)	(13)	(14)	(12)	(13)	(15)	(12)	(13)	(16)
Regressor	DVR2	SPF2	TCR2	DVR2	SPF2	VCR2	DVR2	SPF2	PCR2
(1) Log. Population Size	-.07***	.05	-.16***	-.06***	.05	-.19***	-.05**	.00	-.09**
(2) Log. Population Density	-.03	-.04	-.01	-.03*	-.03	-.01	-.02	-.06*	.02
(3) % Low Income Families	-.07***	.20***	.03	-.07***	.19***	.02	-.07***	.19***	.03
(4) Mobility	-.05**	.04	.14***	-.06***	.07*	.16***	-.06***	.08*	.15***
(5) Ethnic Heterogeneity	-.00	-.08*	.14***	-.01	-.07*	.18***	-.01	-.04	.15***
(6) Sex Ratio	-.01	-.03	.01	-.01	-.04	.02	-.01	-.03	-.01
(7) % Divorced (DVR1)	.97***	---	---	.96***	---	---	.96***	---	---
(8) % Single-Parent Fam. (SPF1)	---	.57***	---	---	.57***	---	---	.62***	---
(9) Total Crime Rate (TCR1)	---	---	.66***	---	---	---	---	---	---
(10) Violent Crime Rate (VCR1)	---	---	---	---	---	.58***	---	---	---
(11) Property Crime Rate (PCR1)	---	---	---	---	---	---	---	---	.64***
(12) % Divorced (DVR2)	---	.03	-.04	---	.03	-.01	---	.00	-.01
(13) % Single-Parent Fam. (SPF2)	.13***	---	.11*	.12***	---	.18***	.11***	---	.11*
(14) Total Crime Rate (TCR2)	-.07***	.18***	---	---	---	---	---	---	---
(15) Violent Crime Rate (VCR2)	---	---	---	-.05**	.17***	---	---	---	---
(16) Property Crime Rate (PCR2)	---	---	---	---	---	---	-.04*	.10*	---
R^2	.92	.72	.76	.91	.73	.70	.91	.70	.72

Note: Only standardized coefficients are presented.

*p < .05; **p < .01; ***p < .001.

positive effects on the total, violent, and property crime rates ($\hat{\beta}_{14,13(4c)} = .11$, $\hat{\beta}_{15,13(4f)} = .18$ and $\hat{\beta}_{16,13(4i)} = .11$, respectively; see columns 4c, 4f, and 4i in Table 4), and it was affected by all three crime rates in return ($\hat{\beta}_{13,14(4b)} = .18$, $\hat{\beta}_{13,15(4e)} = .17$ and $\hat{\beta}_{13,16(4h)} = .10$). However, none of the effects of Time 2 divorce on the crime rates or percent single-parent families were statistically significant. Nonetheless, Time 2 crime rates showed small but significant negative effects on divorce ($\hat{\beta}_{12,14(4a)} = -.07$, $\hat{\beta}_{12,15(4d)} = -.05$ and $\hat{\beta}_{12,16(4g)} = -.04$). Also, Time 2 percent single-parent families had a significant effect on divorce ($\hat{\beta}_{12,13(4a)} = .13$).[9] These observed coefficients suggest that while percent single-parent families and crime reinforced one another, they had quite different relationships with divorce.

A Sketch of the Causal Paths

Extracted from the results from Tables 3 and 4, Figure 2 provided a clearer view of the reciprocal effects among the three variables in question. In the time-lag model, the effects of percent single-parent families and crime on each other across time were considerably strong and positive, whereas those between divorce and crime were relatively weak and negative (see Figures 2a and 2b). In the simultaneous model, reciprocal effects were observed only between single-parenthood and crime, and both crime and single-parenthood each had a unidirectional effect on divorce (see Figures 2d to 2f). Also, the effect of the total crime rate on percent single-parent families was stronger than the reciprocal effect (see Figure 2d). Together, the causal paths suggest that crime and percent single-parenthood acted as causal factors, and divorce was the outcome variable. The relationship between crime and single-parenthood was reciprocal and positive, whereas that between crime and divorce was mostly unidirectional and negative. All causal paths considered, the effects of crime on the family variables were stronger than the effects of these family variables on crime.

DISCUSSION

Results from the present study have demonstrated the importance of family and crime in the study of community structure and organization. This study has shown that structural characteristics including population size, low income, mobility, and ethnic heterogeneity have considerable effects on family and crime. Also, while divorce and single-parenthood affect crime, crime has feedback effects on them. More intriguingly, the feedback effects are stronger.

Generally speaking, a criminal act is a temporal and short-lived event whereas divorce and single-parenthood are events that extend over a period of time. It is rather intriguing that crime actually has rather strong effects on the two family variables. Perhaps at the community level, criminal events are quite prevalent. According to the 2004 Canadian General Social Survey, with questions related to just three violent offenses, four household offenses, and theft of personal property, approximately 1 in 3 Canadian households and 28% of Canadians aged 15 and over had been reportedly victimized at least once within the last year (Gannon and Mihorean 2005). Therefore, the prevalence of criminal victimization and the impact of the more serious offenses may explain crime's influence on the community and the family.

While both divorce and single-parenthood are indicators of family disruption, they have very different relationships with crime. As I suggested in the theoretical discussion, divorce was expected to have a weaker relationship with crime than single-parenthood with crime, but there was no anticipation that the relationship between divorce and crime would be negative. Thus, the observed negative relationship is somewhat of an anomaly. Methodologically speaking, granted that single-parenthood has a positive relationship and divorce a negative relationship with crime, it is important to differentiate the relationships. Otherwise, simply combining them into a single measure of family disruption may produce a much weaker correlation with crime and thus confound the relationships of the variables in question.

The relatively small, but still significant, negative relationship between divorce and crime deserves further discussion. The negative effect of divorce on violence supports the notion that perhaps marital dissolution is a solution to some marital problems including interpersonal conflict. To be sure, while divorce has many negative consequences, it also has some positive outcomes in terms of positive self-concepts in women (Baum, Rahav, and Sharon 2005), gender equality (Yodanis 2005), divorcees' friendship contacts (Kalmijn and van Groenou 2005), women's employment (Hou and Omwanda 1997), and maturity and growth in children (Sever, Guttmann, and Lazar 2007). The finding reported here simply reflects the diverse consequences of divorce.

The observed negative effect of crime on divorce is consistent with the Durkheimian perspective of the integrative function of crime (Durkheim 1966). That is, through crime and the punishment for it, society develops moral consensus of right and wrong, thus resulting in greater unity or integration. Using Durkheim's argument, one may speculate that a heightened sense of integration in the community also positively affects integration at the familial level. In addition, one may further argue that the fear of crime reinforces a sense of interdependency and discourages separation or divorce among couples. However, the explanations offered here are merely speculative, and further research is needed to understand the intricate relationship between crime and divorce.
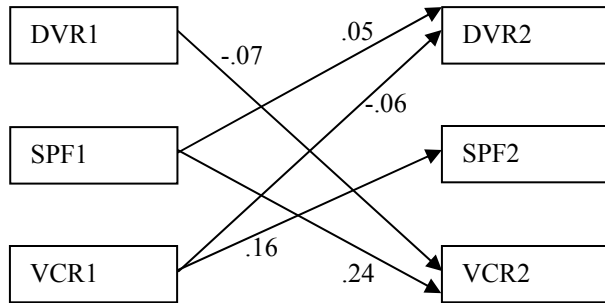
Of course, one may question why the proposed integrative effect of crime on divorce does not seem to

Figure 2. *Time-Lag and Simultaneous Models of the Reciprocal Effects of Divorce, Single-Parent Families, and Crime.*
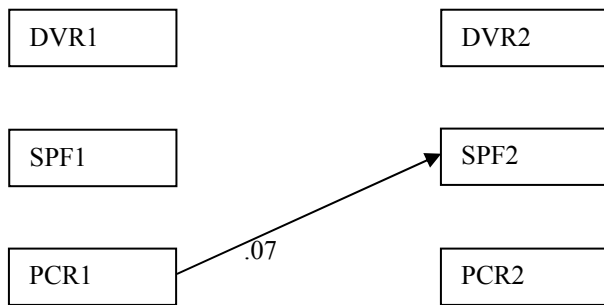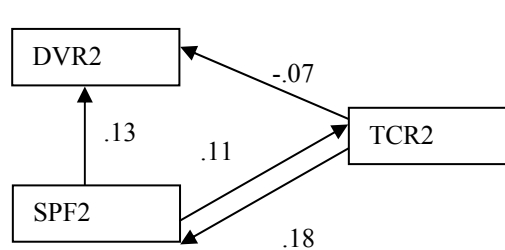

(a) Time-Lag Model with the Total Crime Rate
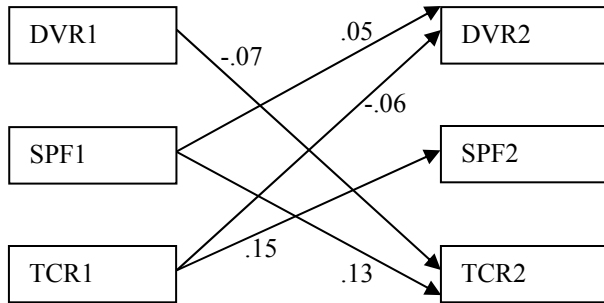
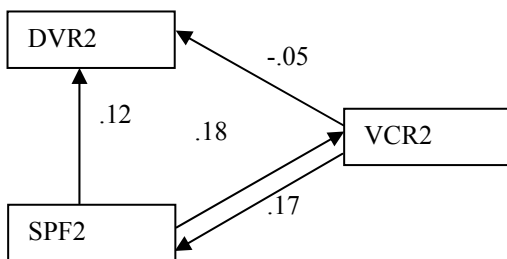(b) Time-Lag Model with the Violent Crime Rate

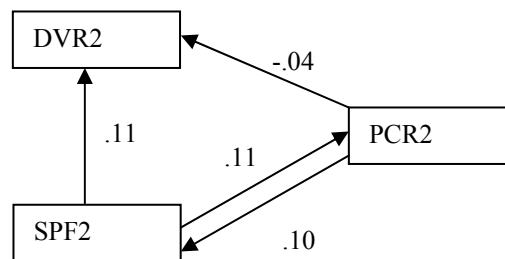(c) Time-Lag Model with the Property Crime Rate

(d) Simultaneous Model with the Total Crime Rate

(e) Simultaneous Model with the Violent Crime Rate

(f) Simultaneous Model with the Property Crime Rate

Note: Coefficients in Figures (a), (b), and (c) are extracted from Table 3; coefficients in Figures (d), (e) and (f) from Table 4. Only statistically significant coefficients are presented (i.e., $p < .05$).

apply to single-parenthood. Perhaps one may speculate that the fear of crime deters individuals in the community from venturing out of their comfort zone, thus increasing the tendency for them to stay with their existing families while reducing the bold attempts to form new ones. Therefore, crime may reduce divorce but increase single-

parenthood. Granted that this explanation may be far from being definitive or satisfactory and certainly does not preclude other possible explanations, it points to the specific direction for future research in terms of the fear of crime explanation and the integrative function of crime.

While the results are somewhat supportive of the "fear of crime" explanation, they do not provide much support to the "incarceration of male offenders" explanation. The observed nonsignificant effects of sex ratio suggest that it may not affect family disruption or crime. Of course, one should by no means reject the incarceration explanation based on just the absence of significant effects. It is possible that the limited variability in the sex ratio (*sd* = 5.98, see Table 1) might have been a factor. Also, sex ratio alone is not a direct measure of male incarceration or marriageability. To investigate marriageability in a more precise manner, perhaps one should also take into consideration related factors including employment status, education, income, and availability ratio (see for example, Messner and Sampson 1991; South and Lloyd 1992; Wilson 1987). Therefore, more research is still needed before the viability of the incarceration explanation can be ascertained.

The traditional social disorganization perspective sees crime as an outcome. If one may suppose that divorce and single-parenthood represent certain aspects of social disorganization, then results from this study have shown that crime is an important cause of disorganization. Following this argument, future research may also examine the potential reciprocal effects between crime and the disorganization precursors including poverty, mobility and heterogeneity.

In term of crime prevention, the finding of the reciprocal effects is particularly important. Conventional wisdom may suggest that crime is a symptom or outcome of the underlying social problems including, but not limited to, poverty, unemployment, low education, inequality, racial relations, discrimination, and family disruption, just to name a few. Therefore, to reduce crime, one should identify the underlying problems and deal with them first. In contrast, the finding here suggests that crime is potentially a cause as well as an outcome of those other problems. In other words, crime is not merely a symptom or outcome. It is a problem in its own right that merits a more direct approach. Perhaps it is important to tackle crime head-on as much as it is to deal with its underlying problems. At any rate, much research is still needed to advance our understanding of the relationship between crime and its related problems.

The present study has a number of limitations. There are limitations in terms of the spatial dimension. Some municipalities in populous provinces such as Ontario and Quebec are adjacent to or in the same geographical cluster of other municipalities. Therefore, there may be potential spatial lag effects and spatial autocorrelations that have not been considered in the analysis (e.g., the effects of the

crime rates of adjacent municipalities on each other; see, for example, Andresen 2006; Gruenewald et al. 2006). On the other hand, municipalities in less populous provinces such as Saskatchewan and Manitoba tend to be sparsely distributed and relatively far from other municipalities in the sample. Perhaps future research may investigate the extent to which the spatial distribution of the municipalities affects the crime rates and related factors.

There are also limitations in terms of the time dimension. Due to the decennial cycles of the Census and bi-Census, there is a five-year lag between the two data points in 1996 and 2001. The lag is rather artificial and largely dictated by data availability.[10] Nonetheless, the variables do show a high level of stability over the five-year period (see Table 2). Also, a fair number of the estimated time-lag effects are similar to the simultaneous effects in strength (see Tables 3 and 4 and Figure 2). To that extent, the five-year lag has some analytical significance in terms of demonstrating the mid- to long-term effects of the predictors. When possible, future research may compare the various lengths of time lag between data points and determine the short- and long-term effects.

There are a number of other important issues related to the time dimension that have not been addressed in the present study. For example, like the trajectories of individual behavior (see Thornberry 1987), perhaps communities also have trajectories of development. Given that there are reciprocal effects between family disorganization and crime, it is quite possible that communities with unfavorable social conditions may move towards a path of increasing disorganization. Thus, it is important to study the development and change of the community over time in terms of using more dynamic modeling (Kubrin and Weitzer 2003). In addition, the community has its ecological contexts in different time periods or eras (Sampson and Morenoff 1997). Future research may address the changing ecological contexts of the community as well as the general conditions or mediating factors common to the different eras.

Endnotes

[1] A reviewer raised the possibility that the observed higher crime rates in small municipalities could be due to outliers and overestimation (see, for example, Osgood 2000). I reexamined the correlations between population size and the crime rates in 2001 for municipalities with population size 100,000 or more ($N = 40$). The correlations were .02, -.15 and -.20 for the violent, property, and total crime rates, respectively. A report by the Canadian Center for Justice Statistics (2002) showed that in 2001, Census Metropolitan Areas (CMAs) with population 500,000 or more had an average total crime rate of 7,626 per 100,000, compared to 8,054 for smaller CMAs. These results agreed with the observed pattern of higher crime rates in smaller

municipalities. Also, outliers in the crime rates had been identified and excluded from the analysis.

[2] In 1996, the Census profile of municipalities contained 100 published ethnic categories, with three response types for each category (i.e., total-, single- and multiple-responses). The heterogeneity index here was constructed based on the total and multiple-responses.

[3] The index has a minimum value of 0 when 100 percent of the population belongs to the same ethnic groups (i.e., p_i = 1.0). The maximum value of the index approaches 1.0 when each ethnic group in the population accounts for only a very small proportion of the population. For example, if four ethnic groups are equal in number and each represents 25% of the population, the index has a value of 0.75. It means that there is a 75% chance that two randomly selected individuals in the population will be members of different ethnic categories.

[4] At the family or individual level, studies have reported some effects of parental marital status on the children's marital status and dissolution (Hanson and Tuch 1984; Musick and Mare 2006). Other studies have reported that premarital characteristics such as cohabitation (Phillips and Sweeney 2005; South, Trent, and Shen 2001) and having a child before marriage (Clarkwest 2006; Greenstein 1990; Lehrer 1988; Lehrer and Chiswick 1993) contribute to the individual's subsequent marital dissolution. At the neighborhood or community level, it is reasonable to expect that a high level of single-parent families may contribute to community social disorganization which, in turn, increases the subsequent risk of martial dissolution in the community. Perhaps these reasons may explain the positive effect of Time 1 percent single-parent families on Time 2 divorce.

[5] Given the high R^2s of models 3a, 3d, and 3g (see Table 3), a reviewer had some concern about multicollinearity. Therefore, in the regression analysis, I examined the variance inflation factors (VIFs). Only three variables, low income, percent single-parent families, and the total crime rate, had VIFs higher than 2.0. Their VIFs in Model 3a were 2.14, 2.90 and 2.02, respectively, suggesting that collinearity had increased the corresponding standard errors by between 1.42 and 1.70 times (Fox 1991). Thus, one may conclude that collinearity did not present too serious of a problem. Also, I have taken several measures to verify and validate the R^2 statistics. First, high R^2s are quite common in studies of divorce rates involving prior levels of divorce. For example, in his time-series study of divorce rate in the United States, South (1985: 36) reported an R^2 of .994 (see also Hellerstein and Morrill 2010; Nunley and Zietz 2010). Second, I checked and repeated the analyses and produced the same results. Third, much of the high R^2 was due to the high correlation between Time 1 and Time 2 divorce (r = .95, see Table 2). I sent the data to Statistics Canada where the correlation

was verified and confirmed. Fourth, Canadian provincial-level data and U.S. state-level data also lent support to the high correlation between the divorce rates across time (see CDC 2010; Statistics Canada 2008).

[6] Similar to the VIF analysis reported earlier (see the preceding endnote), the VIFs were 2.13 for low income and 2.90 for percent single-parent families, thus suggesting that collinearity was not a serious problem.

[7] The finding was rather counter-intuitive, especially given the fact that the observed correlation between divorce (Time 1) and percent single-parent families (Time 2) was $r_{7,13}$ = .41 (see Table 2). To further investigate the relationship, I estimated the partial correlation between them, controlling for percent single-parent families in Time 1. Indeed, the partial correlation was reduced to -.01 (partial correlation not shown in tables). From these results, one may conclude that the effect of divorce on single-parent families over time was not evident, once the level of prior single-parent families was taken into consideration.

[8] To ascertain the finding, I re-analyzed the data using more basic techniques. Divorce, percent single-parent families, and the total crime rate in 1996 were each dichotomized into "high" and "low" categories. Then I compared the means of divorce and the total crime rate in 2001 across the respective categories. In municipalities with low percentages of single-parent families, the 2001 total crime rate was 8,009 for the 1996 low-divorce group (N = 171) and only 6,218 for the high-divorce group (N = 79) (t = 3.26, p < .001). In municipalities with high percentages of single-parent families, the total crime rate was 12,423 for the low-divorce group (N = 75) and only 9,805 for the high divorce group (N = 175) (t = 3.09, p < .001). These comparisons showed that high divorce rates predicted low crime rates. In terms of the reciprocal effect, in municipalities with high percentages of single-parent families, the 2001 percent divorced population was 9.71% for the 1996 low-crime group (N = 99) and 8.69% for the high-crime group (N = 151) (t = 3.66, p < .001), thus suggesting that high crime rates predicted low divorce rates.

[9] Again, to ascertain this finding, I compared the subsample means, and the results were supportive of the finding. Percent single-parent families and the total crime rate in 2001 were each dichotomized into the "high" and "low" categories. In municipalities with high percentages of single-parent families, the mean percentage of divorced population was higher at 9.68% for the low-crime group (N = 89), compared to 8.47% for the high-crime group (N = 161) (t = 4.36, p < .001).

[10] With respect to the time lag between data points, different studies employed various lengths. For example, Sampson and Raudenbush (1999) had a two-year lag in

their study of crime victimization. In his study of neighborhood collective efficacy, Browning (2002) used 1990 census data mixed with 1965-1995 homicide data and survey data in 1994-5 and 1995-7. In their analysis of juvenile homicide, Lee and Bartkowski (2004) included the time-lag effect between 1980 and 1990.

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