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Position Paper

The effects of single-mother and single-father families on youth crime: Examining five gender-related hypotheses

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ABSTRACT

This study examined the effects of the concentrations of single-mother families (SMFs) and single-father families (SFFs) on youth crime. Five hypotheses, including the maternal, same-sex, equality, prevalence and economic disadvantage hypotheses were formulated at the aggregate level and tested using data from 433 Canadian municipalities. Consistent with the prevalence hypothesis, it was found that the concentration of SMFs had a much stronger conducive effect on youth crime than did the SFFs. Also, at high prevalence level, the effect of SMFs was much stronger than its effect at low prevalence level. However, the significant but relatively weak effects of low income in SMFs and SFFs on youth crime offered only limited support to the economic disadvantage hypothesis. The findings suggest that one may need to consider factors and measures that are beyond the economic or financial aspect of the single-parent families.

1. Introduction

The purpose of this study is to examine the effects of single-mother and single-father families on youth crime. Five gender-specific hypotheses are formulated and tested using municipal-level data from 433 Canadian municipalities in 2006 and 2011.

1.1. The conducive effect of family disruption on youth crime: the main hypothesis

Family disruption is considered an important predictor of youth crime (see, for example, Sampson, 1987). At the aggregate level, it is often measured as the percentage of single-parent families, the proportion of divorced population, or a combination of both (Sampson, 1987; Sampson and Groves, 1989). According to Sampson (1987), there are at least three reasons as to why family disruption may cause youth crime in the community. First, at the individual level, youth whose parents are single or divorced commit more crime. Second, single-parent and divorced families are more vulnerable and less likely to participate in community organizations, thus reducing the community's control capacity. Third, these families are also less able to monitor activities in the neighborhood and supervise local youth (Sampson and Groves, 1989; Veysey and Messner, 1999). In addition, family disruption may also negatively affect local friendship networks and collective efficacy (Sampson and Groves, 1989; Sampson et al., 1997). Additional explanations include weak parental attachment, low academic achievement, emotional

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problems and resource disadvantage in disrupted families (Bankston and Caldas, 1998; Beiser et al., 2002; Jang, 1997; Kierkus and Baer, 2002). In short, family disruption causes a number of problems and has negative effects on the community's formal and informal control mechanisms, social networks and collective efficacy which, in turn, cause crime and delinquency to increase.

Research studies have generally shown that the single-parent family causes youth crime to increase. Sampson (1987) analyzed city-level data and reported a criminogenic (i.e., conducive) effect of percent Black households headed by females on Black juvenile homicide rates (see also, Ousey, 2000; Shihadeh and Steffensmeier, 1994). Findings of the conducive effects of the single-parent family were also reported in other studies in terms of male and female youth homicide (Cubbin et al., 2000; Steffensmeier and Haynie, 2000) and other youth offenses including the juvenile offender rate, violent offenses, male and female property crime rates and juvenile robbery rates (Jacob, 2006; Osgood and Chambers, 2000; Ouimet, 2000; Sampson, 1986, 1987; Schulenberg et al., 2007; Shihadeh and Steffensmeier, 1994). Additional support was also obtained from a number of individual- and multi-level analyses of delinquency, youth crime and other youth problems (Anderson, 2002; Bellair and McNulty, 2005; Bernburg and Thorlindsson, 2007; Dunifon and Kowaleski-Jones, 2002; Fomby and Cherlin, 2007; Hay et al., 2006; Haynie et al., 2006; Hoffmann, 2006; Juby and Farrington, 2001; Kierkus and Hewitt, 2009; Knoester and Haynie, 2005; Langton and Berger, 2011; Musick and Meier, 2010; Perrone et al., 2004; Price and Kunz, 2003; Rodgers and Rose, 2002; Spruijt et al., 2001; Theobald et al., 2010; Thorlindsson et al., 2012; Weijters et al., 2007).

The research evidence we have reviewed so far suggests that the concentration of single-parent families is associated with increases in youth crime. Hence, a main hypothesis is formulated. It is predicted that at the aggregate or community level, the proportion of single-parent families has a conducive effect (i.e., statistically positive effect) on youth crime. The hypothesis will be examined using a sample of 433 Canadian municipalities with 2006 data on the proportions of the single-mother family (SMF) and the single-father family (SFF) and 2011 data on female and male youth crime in terms of the rates of total, violent and property offenses.

1.2. Considering the single-mother and single-father families

A rather unique contribution of this study is the adaptation of gender-specific explanations of the relationship between single-parent families and youth crime at the aggregate or community level. Existing research has examined a number of gender-specific explanations of the effects of single-parent families on problem behaviors and delinquency at the individual or household level. That is, the effects of the single-parent family on delinquency may vary depending on the gender of the parent or the child. Yet, not much research has been done on the gender-related relationships of the variables at the aggregate or community level. Therefore, the present study examines at the municipal level five gender-related hypotheses, namely, the maternal, same-sex, equality, prevalence and economic disadvantage hypotheses (i.e., to be labeled as Hypotheses 1 to 5).

In terms of policy measures, by studying and comparing the effects of both single-mother and single-father families, one may have a more precise understanding of how the different configurations of these families may affect the community's ability to control delinquency. Another important policy implication is related to whether economic disadvantage explains the effect of single-parent families on delinquency. If that is the case, then policy measures alleviating the economic conditions of the single-parent families may help to reduce delinquency, and perhaps crime and other related problems as well. If not, then one may need to look into measures that are beyond the economic or financial aspect of the single-parent families.

2. Gender-related hypotheses

2.1. The maternal hypothesis

The maternal hypothesis suggests that the mother represents the more effective control of the child than does the father perhaps due to the mother-child bond starting at infancy, a more intimate relationship, more frequent communication and the amount of time the mother spends with the child (Eitle, 2006; Hemovich and Crano, 2009). In the situation of the child who lives with the single mother from birth but had never lived with the father, the mother represents the only stable parental figure to the child. In the situation of divorce, the maternal hypothesis suggests that the mother-child relationship is likely stronger than the father-child relationship prior to and after the divorce (Ahrons, 2011; Kunz, 2009). In terms of social control, single mothers may exert almost as much influence on their children as mothers do in two-parent families, whereas single fathers fare much worse. Therefore, living with a single mother should cause a lower level of delinquency than living with a single father.

Using data from the National Longitudinal Study of Adolescent Health (Add Health), Cookston (1999) reported that adolescents from single-father homes had the lowest level of supervision, whereas those from single-mother homes had lower rates of alcohol use, drug use and delinquency. Based on a similar data source, Demuth and Brown (2004) reported more involvement in delinquency for adolescents in SFFs than those in SMFs. With the Add Health data, Mack et al. (2007) found that maternal attachment was the most powerful predictor of delinquency. Including data from the subsequent waves of Add Health, Amato and Kane (2011) noted that adolescents living with a single parent reported lower levels of paternal warmth than maternal warmth.

Dunifon and Kowaleski-Jones (2002) analyzed data from the National Longitudinal Study of Youth (NLSY) and reported that single-mother structure did not increase the likelihood of delinquency for African American children probably due to

strong maternal warmth and control. Juby and Farrington's (2001) longitudinal study of South London males revealed that the levels of delinquency and juvenile convictions were higher in homes without the biological mother. In fact, the aggravating effect of living without the biological mother also increased adult convictions later in the adolescent's life. In addition, boys who stayed with their single mothers were similar to boys from low-conflict two-parent families in delinquency rates. A study of ethnic minority students in Northeast U.S. by Mokrue et al. (2011) revealed that boys in SFFs fared worse in behavior problems than those in SMFs. A few research studies also found that SMFs did not cause problem behaviors, delinquency or crime to increase and, in a few cases, even had a protective effect (Andresen, 2006; Beyers et al., 2003; Capowich, 2003; Hemovich and Crano, 2009; Hoffmann, 2002; Ingram et al., 2007; Katz, 2000; Kingston et al., 2009; Koski, 1996; Lansford et al., 2001; Lee and Martinez, 2001; Patchin et al., 2006; Regnerus, 2003; Schulenberg, 2003; Watkins, 2008).

At the aggregate or community level, the maternal hypothesis suggests that the concentration of SMFs as opposed to the concentration of SFFs represents relatively the more effective community social control of its youth. That is, both male and female parents represent social control agents in the neighborhood or the community. Thus, while they are parents to their own children, they are also authority figures to other children. Here we do not suppose that single-parent families are more effective than two-parent families in social control. Rather the argument is that given the condition of both being single-parent families, SMFs contribute more than SFFs towards the community's social control of youth. Put it slightly different, should the ability of the community to control its youth be reduced with single-parent families, as opposed to two-parent families, then it should reduce more with the concentration of SFFs than it does with SMFs. Given the maternal argument at the aggregate level, it is hypothesized that the concentration of SFFs has a stronger conducive effect on youth crime than does the concentration of SMFs (Hypothesis 1).

2.2. The same-sex hypothesis

The same-sex hypothesis suggests that the parent who is of the sex same as the child is the more effective role model for the child (Eitle, 2006; Hemovich and Crano, 2009). The mother is the more effective role model for the daughter, and the father is the more effective role model for the son. In terms of delinquency, that means girls living with their mothers are less delinquent than girls living with their fathers. It also means that boys living with their fathers are less delinquent than boys living with their mothers. For girls, the SFF has a stronger delinquency causing effect than the SMF. For boys, the SMF has a stronger delinquency causing effect than the SFF.

A number of studies found support for the same-sex hypothesis. Based on a study of over 600 adolescents and parents, Thomas et al. (1996) found that White male adolescents living with the single mother without nonresident father involvement had the highest levels of delinquency, drinking and illicit drug use. Also SMFs contributed significantly to male but not female delinquency, drinking and drug use. In their study of children's aggressive behavior, Ram and Hou (2005) reported evidence suggesting that living with a single mother was relatively more harmful to boys than to girls. In Eitle's (2006) study of Florida youth, female youth living with their single mothers were less delinquent than those living with their single fathers. Hemovich and Crano (2009) found that in father-only families, there were higher levels of inhalant and amphetamine use for girls than for boys. In their study of Flemish adolescents, Vanassche et al. (2014) observed that relationship with the same-sex parent had a stronger reduction effect on delinquency.

As noted earlier, both male and female parents represent social control agents and authority figures to other children in the neighborhood or the community. Applying the same-sex hypothesis at the aggregate level, one may hypothesize that a higher proportion of female single parents in the community, as opposed to male single parents, contributes to the ability of the community to control female youth. Similarly, a higher proportion of male single parents, as opposed to female single parents, strengthens the community's social control of male youth. Based on the same-sex hypothesis, one may expect that at the aggregate level, the concentration of SFFs should have a stronger conducive effect on female youth crime than does the concentration of SMFs (Hypothesis 2a), whereas the concentration of SMFs should have a stronger conducive effect on male youth crime than does the concentration of SFFs (Hypothesis 2b).

2.3. The equality hypothesis

In contrast with the maternal and same-sex hypotheses, the equality hypothesis suggests that given the increasing equality between men and women in our society, there is little or no difference between the female and male single-parent families with respect to the child's behavioral outcomes (Eitle, 2006). In this way, both female and male single-parent families contribute equally to the community's collective ability to control its youth. Therefore, one may expect that at the aggregate level, there is no difference in the effects of the concentration of SMFs and the concentration of SFFs on youth crime (Hypothesis 3).

The increased equality between the sexes in European and America has a positive effect on women's employment. Using longitudinal data from 16 countries, Van Damme and Kalmijn (2014) found that women in countries with more egalitarian gender role norms and higher women's employment rate worked more after marital separation. Their finding implies that gender equality reduces the employment gap between the sexes, and perhaps also the gap between female and male single parents.

Apart from employment, other positive changes in divorce or separation may narrow the gap between female and male single parents. Baum et al. (2005) studied a sample of divorced custodial mothers in Israel and found that the participants

tended to become more independent. They also felt more in control of and more responsible for their lives. Seeing their changes as important and satisfying, they had stronger self-esteem and a greater sense of competency, and they expressed a sense of confidence in confronting challenges. A number of studies have also found that divorce has some positive outcomes such as positive self-concepts in women, gender equality, increased friendship contacts, maturity and growth in children, forgiveness leading to well-being, and life satisfaction (Baum et al., 2005; Bourassa et al., 2015; Kalmijn and Van Groenou, 2005; Sever et al., 2007; Yárnoz-Yaben, 2016; Yodanis, 2005).

Using three data sets, the 1988 National Education Longitudinal Study, the 1980–1984 High School and Beyond Study, and the 1972–1991 General Social Survey, Powell and Downey (1997) examined the effects of same-sex parenting in one-parent households on multiple outcomes in boys and girls in terms of self-evaluation (i.e., self-concept, locus of control, happiness and sadness), relationships with others (i.e., parents, dating, opposite-sex peers and same-sex peers), multiple school outcomes (i.e., dropping out, grades, test scores, educational expectations and college attendance), multiple deviant behavior indicators (i.e., teenage parenthood, misbehavior in school, cigarette use, alcohol use, marijuana use, cocaine use and trouble with the law), and adult outcomes (i.e., measuring the outcomes for the teenagers in their adult years in terms of happiness, marriage, exciting life, friends, health, family, family income and education). With very few exceptions, the sex of the single parent did not cause much difference in the outcomes. In addition, same-sex single parents have just about the similar effects on their children as opposite-sex single parents. Regarding their findings, Powell and Downey (1997) offered three explanations. First, the influence of the opposite-sex parent might have been underestimated. Second, male single parents may adapt to their changed household situation and changed parenting role, and they may parent as effectively as female single parents. Third, the same-sex parenting argument might just have been a theoretical bias stemmed from the study of female singleparents and male delinquency. To that extent, their results and explanations are consistent with the equality hypothesis.

Based on juvenile court statistics from Pennsylvania, Verrecchia and Arp (2015) noted that living with the birth mother only or the birth father only did not have any significant effect on drug or person offenses. The negative outcomes were associated with living with a parent and a step-parent. To that extent, the sex of the single parent did not matter. Similarly, a number of studies have shown that family structure is not the most crucial factor of delinquency, and there are more important factors such as the relationship between the parents, the parent-child relationship, parental attachment, supervision and involvement (Boutwell and Beaver, 2010; De Coster et al., 2006; Eitle et al., 2013; Ingram et al., 2007; Kingston et al., 2009; Lansford et al., 2001; Mack et al., 2007; Schroeder et al., 2010; Spruijt et al., 2001; Watkins, 2008). Perhaps the sex of the single parent is not crucial simply because single parenthood per se is not a crucial cause of delinquency.

In sum, the reasons supporting the equality hypothesis include the increasing equality between the sexes, the potential positive outcomes for women post-divorce or as single parents, the adaptive parenting of male single parents, the similar effects of female and male single-parents, and the equally weak effects of both.

2.4. The prevalence hypothesis

In *The Truly Disadvantaged*, Wilson (1987) discusses the phenomenon of the African American underclass in major U.S. cities. He focuses on structural factors, particularly the shift in the economy and the labor market leading to high unemployment rate in men, the decline in men's marriageability, the increase in unmarried women with children, the fleeing of the middle class, and eventually the ghettoizing of the community and the concentration of an underclass. With the concentration of the underclass, the community is no longer able to provide services and support for its members. Thus, neither the community nor the individuals in it can effect positive changes to avert the continuing deterioration. While the main theme of Wilson's discussion is about economic disadvantage, an important notion is the concentration or prevalence of that disadvantage at the community level. Essentially, the greater the concentration or prevalence, the more entrenched are the problems, and the more difficult it is for the community or individuals to effect positive changes.

Focusing on Wilson's (1987) notion of concentration or prevalence and given the aggregate-level focus of the present study, perhaps an argument can be made that the effects of the SMF and the SFF quite possibly depend on their levels of prevalence. That is, SMFs are generally more prevalent than SFFs in North America. The 2012 Census Population Survey in the United States revealed that while mother-only families with children under 18 represented 12.1% of all families, the corresponding representation for father-only families was just 2.3% (Vespa et al., 2013). In Canada, female single-parent families represented 12.8% of all census families in 2011, compared to 3.5% for male single-parent families (Statistics Canada, 2012). At the aggregate or community level, the concentration of SFFs in some communities may be too low to impact youth crime. Based on this prevalence hypothesis, it is reasonable to expect that the concentration of SMFs should have a stronger conducive effect on youth crime than the concentration of SFFs (Hypothesis 4).

Apart from the individual- or household-level studies presented earlier, few studies, if any, have examined and compared the different effects of the concentration of SMFs versus the concentration of the SFFs on delinquency or youth crime at the aggregate level. Given the notion of prevalence, perhaps we can derive some indirect support from existing research on the effect in different groups with different levels of SMF prevalence. For example, there is a higher prevalence of SMFs in the African American population than in the Caucasian American population. By comparing the effects of SMFs on delinquency and youth crime in the two different populations, perhaps we can derive some indirect evidence of how SMF prevalence may moderate the effect of SMFs.

In Sampson's (1987) study of adult and juvenile homicide rates and robbery rates in 150 U.S. cities in 1980, he reported the effects of the percentage of households with children headed by females on the rates of juvenile robbery for Blacks and

Whites. The standardized effect for Blacks was 0.45, and the corresponding effect for Whites was 0.32. For that particular sample, the average percentage of households headed by females was 26.4% for Blacks and 9.3% for Whites. Therefore, the different magnitudes of the effects do support the notion that the effect of SMFs is stronger in the racial group with a higher SMF prevalence. In Ousey's (2000) analysis of 121 cities in the U.S. in 1970 and 1990, he observed that the change in female-headed families between 1970 and 1990 had a significant effect on the juvenile homicide rate for Blacks, with a change in SMF prevalence from 32.7% 1970 to 51.6% in 1990, thus lending some support to the prevalence hypothesis.

In short, the rationale and evidence presented so far do suggest that perhaps one may include a sub-hypothesis: At the aggregate level, the effect of the concentration of SMFs on youth crime is stronger in communities with a high SMF prevalence as opposed to in communities with a low SMF prevalence (Hypothesis 4.1).

2.5. The economic disadvantage hypothesis

Extending Wilson's argument (1987), we may also consider the possibility that the SMF has a stronger effect on youth due to economic disadvantage. Hoffmann (2006) reported that mother-only families were significantly more likely to live in impoverished areas than father-only families. In Zhan and Pandey's (2004) sample from the 1993 *Panel Study of Income Dynamics*, they found that only 8% of single mothers had at least 4-year college degree as opposed to 17% of single fathers, and the employment rates were 67% and 90% for the respective groups. In Canada, the average total income for female single-parent families was just $42,300, compared to $60,400 for male single-parent families (Williams, 2010). Also single-mother households had lower homeownership than single-father households (52.5% and 64.9%, respectively).

Comparing female and male single parents, Zhan and Pandey (2004) found that after controlling for multiple factors, female single parents had significantly lower labor income than their male counterparts. Also, among those with 4-year college degree, female single parents tended to have significantly lower labor income, live in a house with lower value, and be less likely to live above poverty, suggesting the existence of gender-based discrimination in the labor market and other areas.

The percentage of female-headed households with children has been used as an indicator of community poverty, economic deprivation or economic disadvantage in numerous studies, and it has been shown that the variable correlates well with other indicators such as low income, poverty, low education, unemployment, public assistance and rental housing (see, for example, Bellair and McNulty, 2005; Bellair et al., 2003; Elliott et al., 1996; Haynie et al., 2006; Lee and Bartkowski, 2004; McDonald and Gover, 2005; McNulty and Bellair, 2003; Strom and MacDonald, 2007; Vazsonyi et al., 2006; Welsh et al., 2000). Therefore, it is reasonable to suppose that there is a close connection between SMFs and economic disadvantage to the extent that these families are financially or economically deprived.

In addition, studies have found that economic disadvantage at the aggregate level, with the percentage of single-mother families/households as one of the indicators, is an important cause of delinquency and youth crime. Based on two samples of youth from Denver and Chicago, Elliott et al. (1996) found that neighborhood disadvantage, with the percentage of single-parent families (i.e., most were SMFs) as an indicator, had an indirect effect on delinquency through informal social control. With data from 43 middle schools in Philadelphia, Welsh et al. (2000) observed that community poverty, with the percentage of single-parent households (i.e., most were single-mother households) as one of its indicators, was a significant cause of school-level delinquency. Using data from the National Education Longitudinal Survey, with 14,358 adolescents from 2988 local areas, McNulty and Bellair (2003) included the percentage of households headed by women as one of the four indicators of concentrated disadvantage. They found a direct effect of area concentrated disadvantage on adolescent fighting, and an indirect effect of it through family well-being.

Lee and Bartkowski (2004) studied juvenile homicide in 1400 rural counties and 499 urban counties in the U.S. They found that county-level economic disadvantage, with the percentage of female-headed households as one of the six indicators, had positive effects on both rural and urban juvenile homicide rates. In their analysis using Add Health data, Bellair et al. (2003) found that concentrated disadvantage in the census tract, with the percentage of female-headed households as an indicator, caused individual violent delinquency (see also, Bellair and McNulty, 2005). Also based on data from the Add Health survey, Haynie et al. (2006) noted that neighborhood disadvantage had a direct effect on adolescent violence and an indirect effect through exposure to violent peers.

In their study of homicide rates in 159 cities, McDonald and Gover (2005) measured concentrated disadvantage with the percentage of female-headed households as one of the four indicators. Their findings revealed that the change in concentrated disadvantage over time was causally related to the change in youth-on-youth homicide. Strom and MacDonald (2007) included the percentage of female-headed households in their measure of city-level socioeconomic disadvantage in their study of youth homicide in 155 U.S. cities in the 1980s and 1990s. They reported that city-level disadvantage was a significant cause of the homicide rates in Black teenagers, Black young adults and White teenagers.

Given the above, one may expect that due to economic disadvantage, children living with single mothers are more prone to youth crime than those living with single fathers. At the community level, a high concentration of SMFs signifies a higher concentration of low-income families which, in turn, may lead to decreases in community resources, organization and supervision of youth (Sampson, 1987; Sampson and Groves, 1989; Veysey and Messner, 1999). Therefore, based on the economic disadvantage hypothesis, it is proposed that compared to the concentration of SFFs, the concentration of SMFs has a stronger conducive effect on youth crime (Hypothesis 5). Also, to ascertain the role of economic disadvantage in causing youth crime using more direct evidence, it is predicted that the concentration of low income in SMFs has a conducive effect on youth crime

(Hypothesis 5a). Similarly, it is hypothesized that the concentration of low income in SFFs has a conducive effect on youth crime (Hypothesis 5b).

3. Methods

3.1. The data

This study combined 2011 municipal-level data from the Canadian Uniform Crime Reporting Survey (Statistics Canada, 2015a) and the 2006 Bi-Census data for the corresponding municipalities. The Canadian Centre for Justice Statistics (CCJS) has been conducting the annual Uniform Crime Reporting Survey since 1962, and the survey is mandatory for all police services in Canada. However, the quality of the data is subject to limitations (Statistics Canada, 2015a). For example, the UCR does not include criminal incidents that have not been reported to the police. And there was no auditing of the reported data by the CCJS. Also, there were discrepancies in the reporting practices in some police services in Ontario before 2001, resulting in the over-reporting of minor incidents. In addition, some police services may not be able to submit full information to the CCJS due to technical or resources difficulties in some years. In spite of these limitations, the UCR is regarded as the most reliable source of official crime reports in Canada, used by policy makers in the provinces and the federal government, and public and private researchers.

A sample of 433 Canadian municipalities was selected for analysis. The sample was selected by excluding 139 rural municipalities, 48 other municipalities with population density less than 10 persons per km^2, and three municipalities with population less than 1000 persons, thus effectively excluding a total of 190 municipalities from the analysis. An important reason for excluding the rural municipalities was the significantly smaller population size ($\overline{X}$ = 13,016 persons) and low population density ($\overline{X} = 97/km^2$) in these municipalities. About 44 percent of the rural municipalities have population density below 10 persons/km^2. Using that as a criterion and applying it to other municipalities, 48 more municipalities were excluded from the sample. In addition, places in Canada with 1000 population are by definition considered rural (Du Plessis et al., 2004). Therefore, three other municipalities were excluded from the sample under that criterion. The differences between the excluded municipalities and the selected sample will be discussed in the next section in terms of the major variables.

3.2. The variables

3.2.1. Crime data

A microdata file, entitled *Incident-based Crime statistics, by Detailed Violations and Police Services (1998) to 2011*, provided data on the numbers of females and males between 12 and 17 years of age charged with Canadian Criminal Code offenses (Canadian Centre for Justice Statistics, 2013; Statistics Canada, 2015a). From the data, sex-specific youth violent, property and total crime rates were constructed. For example, the female youth violent crime rate was constructed as the number of females between 12 and 17 charged with violent offenses per 100,000 females in the same age group. The total crime rate refers to all Criminal Code violations excluding traffic-related offenses. In 2011, the municipal average female youth total crime rate was reportedly at 2043 offenses per every 100,000 female youth population (see Table 1). The sample average rates of female youth violent and property crime were 675 and 697. The corresponding sample averages were 5165, 1335 and 2364 for male youth. The male average in violent crime was about 2.0 times of the female average, and the male average in property crime was about 3.4 times of the female average.

The youth crime rates generated from this sample were quite comparable to the actual Canadian rates. Based on this sample of 433 municipalities, the youth crime rate averages, adjusted by the size of the municipal population, were 2256, 797 and 841 for youth total, violent and property crime rates, respectively (not shown in Table 1). The Canadian rates in 2011 were 2344, 805 and 903, respectively (Statistics Canada, 2015b). The adjusted sample averages were between 93% and 99% of the actual Canadian youth crime rates in 2011.

3.2.2. Characteristics of single-parent families

The single-parent family refers to a family composed of a single parent with one or more children under 18 years of age. Based on this sample of 433 municipalities, the average percentage of SMFs was 12.0%, and that of SFFs was 3.1% in 2006. The averages were quite close to the nation-wide percentages of SMFs and SFFs in Canada in 2006 at 12.7% and 3.2%, respectively (Statistics Canada, 2012). While shared custody of children is increasing in Canada (Juby et al., 2005), most children (about 70%) reside with the mother after a separation or divorce, and few (15%) live with the father (Sinha, 2014). This explains the relatively small average percentage of SFFs. Methodologically speaking, the data for the percentages of SFFs were still based on the sample of 433 municipalities, and the data for SFFs should be quite robust, given that they were part of the census data.

3.2.3. Population characteristics

The definition of low income was based on Statistics Canada's low-income cut-offs (Paquet, 2002). Of the 433 municipalities in the sample, on average 8.9% of the census economic families were by definition living in low income (per after-tax income) in 2006, quite close to the Canadian family low income rate of 8.4% in the same year (Statistics Canada, 2015c). The

Table 1
Basic statistics ($N = 433$).

2006 variables	Mean	SD	25th%	50th%	75th%
Population size	61,996	193,978	6387	12,247	42,131
Log. population size	9.7	1.4	8.8	9.4	10.7
Population density (per sq. km.)	463	631	57	301	613
Log. population density	5.3	1.5	4.1	5.7	6.4
Low income families (%)	8.9	4.1	5.8	7.6	11.0
Population mobility (%)	14.6	4.8	10.9	14.0	17.5
Ethnic heterogeneity	0.74	0.10	0.71	0.77	0.82
Population divorced (%)	8.2	2.2	6.7	7.8	9.5
Single-mother families (%SMFs)	12.0	4.1	9.3	11.5	13.9
Single-father families (%SFFs)	3.1	1.0	2.4	3.0	3.7
Low income in SMFs (%)	19.6	10.1	13.3	19.2	25.3
Low incomes in SFFs (%)	8.0	10.6	0.0	5.9	12.5
2011 variables					
Female youth total crime rate (FTC11)	2043	3565	298	1008	2383
Female youth violent crime rate (FVC11)	675	1082	0	331	840
Female youth property crime rate (FPC11)	697	1376	0	290	815
Male youth total crime rate (MTC11)	5165	5887	1743	3379	6239
Male youth violent crime rate (MVC11)	1335	1313	491	996	1783
Male youth property crime rate (MPC11)	2364	2882	624	1386	2932

Note: Crime rates are calculated as the number of offenses per 100,000 male or female youth population between 12 and 17 years of age.

sample average percentages of SMFs and SFFs with low income were 19.6% and 8.0% in 2006 (see Table 1). Given the relatively high correlation between the percentage of families with low income and the percentage of SMFs with low income ($r = 0.67$, not shown in Table 1), the percentage of families with low income was excluded from the multivariate analysis to avoid potential collinearity problems.

A number of variables including percent population divorced, population size and density, mobility and ethnic heterogeneity were employed as statistical control variables. These variables were often included in previous research in the study of the single-parent family and youth crime (Sampson, 1987). Percent population divorced referred to the percentage of persons aged 15 or over identified as divorced in the current year. The sample average percentage of divorced population was at 8.2% in 2006.

Population size and population density have been found to be important factors of youth crime (Ennett et al., 1997; Jacob, 2006; Sampson, 1987; Schulenberg, 2003; Steffensmeier and Haynie, 2000). Population size referred to the population count of the municipality in 2006, and population density referred to the number of habitants per square kilometer within the municipality. The sample average population size was 61,996 with an average density of 463 inhabitants per square kilometer. Following the usual practice of previous research, they were logarithmically transformed and included in the analysis as statistical control variables.

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 sample average percentage of movers in 2006 was 14.6%.

Ethnic heterogeneity was a composite variable based on multiple categories of ethnic identity (Statistics Canada, 2003). Blau's (1977) index was used here to measure the degree of ethnic heterogeneity, constructed as $(1 - \Sigma p_i^2)$, where p_i represents the proportion of an ethnic group relative to the population. The index has a minimum value of 0 when 100 percent of the population belongs to the same ethnic group (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. Blau's index has been used as a measure of ethnic or racial heterogeneity in related studies (see, for example, Hirschfield and Bowers, 1997; Osgood and Chambers, 2000; Sampson and Groves, 1989; Smith and Jarjoura, 1988, 1989; Sun et al., 2004; Veysey and Messner, 1999; Warner and Pierce, 1993). In this study, the heterogeneity index had a value of 0.74 in 2006.

3.2.4. Comparing the sample with the excluded municipalities

As expected, the municipalities in the sample were characteristically more urban compared to the excluded municipalities. Apart from having lower population size and density, the excluded municipalities on average also had lower levels of population mobility (12.4%), ethnic heterogeneity (0.71), divorced population (7.7%) and low income in SMFs (16.4%) (statistically significant with $p < 0.01$; results not shown in Table 1). On the other hand, while the youth crime rates in the excluded municipalities were lower than those in the sample, the differences were not statistically significant in all but one comparison. The only significant difference, barely significant at the 0.05 level, was found in the female youth property crime rate, with an average of 434 offenses per 100,000 population among the excluded municipalities, compared to an average of 697 for the sample. To that extent, the exclusion generated a characteristically more urban sample without compromising much of the outcome variables, that is, the youth crime rates.

3.3. Testing hypotheses at the aggregate level

Since this study is dealing with the adaptation of individual-level or household-level explanations for aggregate-level data, it is important to clear a few methodological issues before proceeding further. A common problem with macro-level explanations is ecological fallacy. That is, correlation at the aggregate level is erroneously used to prove the correlation at the individual-level. For example, in Durkheim's (1951) study of suicide, based on the higher rates of suicides in Protestant-majority provinces as opposed to Protestant-minority provinces, he concluded egoism a cause of suicide. An obvious problem is that one cannot be sure as to whether most of those who committed suicide in Protestant-majority provinces were in fact Protestants. Another problem is that Durkheim did not have data on "suicides due to egoism". He used a general suicide rate and inferred the different causes of suicide based on the associations between the variables.

Therefore, one may suppose that in most cases a correlation at the aggregate level cannot be used to prove the corresponding correlation at the individual or household level. For example, a strong correlation between the concentration of SMFs and the youth crime rate does not necessarily mean that youth committing crime are from SMFs. Second, one may formulate aggregate-level hypotheses. For example, a strong correlation between the concentration of SMFs and the youth crime rate is consistent with the aggregate-level explanation that a lower level of social control in the community increases youth crime (see, for example, Sampson, 1987). Third, this study uses youth crime rates representing the youth population in the municipality, not specifically for youth from single-parent families. Given the aggregate-level nature of the hypotheses linking the concentration of single-parent families with youth crime in general, and not specifically the crime of youth from single-parent families, the general rates should be rather sufficient for the purpose of testing the hypotheses.

3.4. Models and statistics

Apart from the logarithmic transformation of population size and population density, the statistical analysis uses linear multivariate regression analysis with the ordinary least squares method of estimation (see, for example, Johnson and Bhattacharyya, 2010) and the statistical software SPSS (IBM Corp, 2015). Each linear multivariate regression model involves the estimation of the value of the dependent variable, y, by the independent variables x_j (j = 1, 2 3, …), regression coefficients $\widehat{\beta}_j$, and the residual term $\widehat{e}$: $\widehat{y} = \text{intercept} + \widehat{\beta}_1 x_1 + \widehat{\beta}_2 x_2 + \widehat{\beta}_3 x_3 \ldots + \widehat{e}$. The least squares estimator obtains the best fit by minimizing the sum of squares of the residual terms term $\sum \widehat{e}^2$. Each regression coefficient $\widehat{\beta}_j$ represents the effect of the corresponding independent variable x_j on the dependent variable *y*. The regression coefficients $\widehat{\beta}_j$ reported in the tables are standardized.

In each of the baseline regression model, the dependent variable is the youth crime rate, and the independent variables include logarithmic population size, logarithmic population density, population mobility, divorce, percent single-mother families (%SMFs) and percent single-father families (%SFFs). In the final model, two additional variables, low income in SMFs and low income in SFFs are added to the analysis.

4. Results

The regressions of 2011 youth crime rates on the 2006 percentages of SMFs and SFFs, controlling for divorce, population size and density, mobility and ethnic heterogeneity, were presented in Table 2. Supporting the main hypothesis, %SMFs and % SFFs had significant conducive effects on youth crime rates (i.e., criminogenic effects that are statistically positive and statistically significant). The $\widehat{\beta}$ coefficients of %SMFs were all positive and strong, with magnitudes ranging between 0.30 and 0.48 (see Table 2). In comparison, the $\widehat{\beta}$ coefficients for %SFFs were relatively modest, with five statistically significant effects ranging between 0.11 and 0.20. At any rate, these effects were in the direction predicted by the main hypothesis, suggesting that the concentrations of SMFs and SFFs did contribute to higher youth crime rates.

The maternal hypothesis (Hypothesis 1) suggested that %SFFs should have a stronger conducive effect on youth crime than does %SMFs. The corresponding $\widehat{\beta}$ coefficients did not support the hypothesis. That is, contrary to the prediction of the hypothesis, %SFFs had a weaker conducive effect on youth crime than did %SMFs. For example, the effect $\widehat{\beta}$ of %SMFs on the female youth total crime rate was 0.43, more than twice the effect $\widehat{\beta}$ of %SFFs at 0.20. The contrast was even greater in terms of the male youth total crime rate, with the $\widehat{\beta}$ of %SMFs more than three times of that of %SFFs (i.e., 0.48 and 0.14; see Table 2).

The same-sex hypothesis predicted that %SFFs should have a stronger conducive effect on female youth crime than does % SMFs (Hypothesis 2a). The observed $\widehat{\beta}$ s were not consistent with the hypothesis, given that the $\widehat{\beta}$ s were about twice as strong for %SMFs (e.g., 0.43 compared to 0.20 for female youth total crime; see Table 2). The same-sex hypothesis also predicted that %SMFs should have a stronger conducive effect on male youth crime than %SFFs (Hypothesis 2b). The observed $\widehat{\beta}$ s appeared to support the hypothesis, with the effect coefficients of %SMFs on the male youth crime rates many times larger than the coefficients of %SFFs (i.e., the coefficients were 0.48, 0.40, and 0.40 compared to 0.14, 0.03 and 0.11; see Table 2). On the other hand, the same-sex hypothesis would also predict a much larger effect of %SMFs on male youth crime than on female youth crime. The observed $\widehat{\beta}$ s of %SMFs on male youth crime rates were only slightly stronger than those on female youth crime rates (i.e., $\widehat{\beta}$ s were 0.48, 0.40 and 0.40 for the male rates and 0.43, 0.30 and 0.35 for the female rates). Therefore, taken together, the same-sex hypothesis (Hypothesis 2b) received only rather limited support from the results.

Given the rather substantial difference in the effect coefficients between %SMFs and %SFFs, the equality hypothesis (Hypothesis 3) did not receive any support. Both the prevalence hypothesis and economic disadvantage hypothesis (i.e.,

Table 2
Regressions of 2011 youth crime rates on 2006 social disorganization variables and percentages of single-mother families (SMFs) and single-father families (SFFs) ($N = 433$).

2006 regressors	FTC11	FVC11	FPC11	MTC11	MVC11	MPC11
Log. population	-0.20***	-0.21***	-0.16***	-0.27***	-0.14**	-0.32***
Log. population density	-0.10	-0.12*	-0.05	-0.03	-0.04	0.00
Population mobility	0.04	0.11*	0.06	0.13**	0.16**	0.08
Ethnic heterogeneity	0.11*	0.15**	0.07	0.06	0.04	0.06
Population divorced	-0.20***	-0.12*	-0.16**	-0.19***	-0.06	-0.16***
%SMFs	0.43***	0.30***	0.35***	0.48***	0.40***	0.40***
%SFFs	0.20***	0.16***	0.15**	0.14***	0.03	0.11*
R^2	0.32	0.22	0.22	0.40	0.23	0.34

Note: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$. Female youth total crime rate (FTC11); Female youth violent crime rate (FVC11); Female youth property crime rate (FPC11); Male youth total crime rate (MTC11); Male youth violent crime rate (MVC11); Male youth property crime rate (MPC11). All coefficients presented in the table are standardized linear OLS regression coefficients.

Hypotheses 4 & 5) predicted a stronger effect of %SMFs on youth crime. The evidence supported both. As noted, the $\widehat{\beta}$ coefficients of %SMFs on youth crime were at least twice as strong as those of %SFFs.

4.1. An in-depth examination of the prevalence hypothesis

Hypothesis 4.1 proposes that at the aggregate level, the effect of %SMFs on youth crime is higher in communities with a high SMF prevalence. We examined the prevalence hypothesis in greater depth by dividing the municipalities into two subsamples based on the SMF prevalence. One subsample contained municipalities with relatively low SMF prevalence (i.e., % SMFs up to 11.5%; $N = 216$), and another subsample represented the higher prevalence group (i.e., %SMFs over 11.5%; $N = 217$). The low prevalence group had a mean of 9.0% (SD = 1.7%) whereas the high prevalence group had a mean of 15.0% (SD = 3.6%) (not shown in tables).

The regressions of 2011 youth crime rates on %SMFs and %SFFs by the two subsamples were presented in Table 3. Supporting Hypothesis 4.1, in municipalities with lower SMF prevalence, the effects of %SMFs on youth crime were relatively weak. In contrast, in municipalities with higher SMF prevalence, the effects of %SMFs were much stronger. For example, the $\widehat{\beta}$ coefficient of %SMFs on female youth total crime was just 0.17 for the low prevalence group but 0.28 for the high prevalence group, about 1.6 times larger in magnitude. The contrast was even stronger in terms of the effect of %SMFs on male youth total crime, with $\widehat{\beta}$ coefficient of 0.16 for the low prevalence group and 0.34 for the high prevalence group, about 2.1 times larger in magnitude. The greatest contrast was found in the effect of %SMFs on the male youth property crime rate, with $\widehat{\beta}$ coefficients of 0.12 and 0.35 for the low and high prevalence groups, respectively (i.e., with the latter about 2.9 times larger in magnitude).

One may also see the influence of prevalence by comparing the effects of %SMF and %SFFs on youth crime within the low-prevalence group. That is, at a low prevalence level, %SMFs had more or less the same effect on youth crime as did %SFFs. For example, the $\widehat{\beta}$ coefficient of %SMFs on the female youth total crime rate was 0.17, compared to 0.19 for %SFFs (see Table 3a). The $\widehat{\beta}$ coefficients of %SMFs and %SFFs on the male youth total crime rate were 0.16 and 0.15, respectively. Given its low prevalence in some municipalities, perhaps the concentration of SMFs did not form a critical mass to exert a strong effect on youth.

At high prevalence, %SMFs had much stronger effects on youth crime than did %SFFs. For example, the effect $\widehat{\beta}$ of %SMFs on the female youth total crime rate was 0.28, compared to 0.23 for %SFFs (see Table 3b). The effect $\widehat{\beta}$ s of the two variables on the male youth total crime were 0.34 and 0.16, thus suggesting an even greater contrast caused by the high SMF prevalence. Together with the earlier observations, these results provided rather consistent support to both Hypotheses 4 and 4.1.

Ideally, it would be beneficial to examine how the different levels of SFF prevalence may influence its effect on youth crime. Unfortunately, the SFF prevalence was generally too low to make meaningful comparisons. For the entire sample of municipalities, the highest percentage of SFFs reached only 9.8%. After dividing the municipalities into two subsamples by the SFF prevalence, one group had a mean of 2.9% (SD = 0.9%; $N = 216$) and the other group had a mean of only 3.3% (SD = 1.1%; $N = 217$) (not shown in tables). At any rate, the reported results did help prove the point that prevalence could make a difference. That is, a high SMF prevalence was associated with a much stronger effect on youth crime. Perhaps the same could happen to the SFF as it increases in prevalence in the future. For now, there is at least some supportive evidence that prevalence could explain the difference in the effects of %SMFs and %SFFs on youth crime.

4.2. The economic disadvantage hypothesis

As noted before, the stronger effect of the SMF concentration on youth crime lent support to the economic disadvantage hypothesis (Hypothesis 5), given the fact that SMFs tend to be more economically disadvantaged. As part of the economic disadvantage hypothesis, Hypotheses 5a and 5b predicted that the percentages of SMFs and SFFs with low income should have conducive effects on youth crime. The regression results related to the hypotheses were presented in Table 4.

Table 3
Examining the prevalence hypothesis: Regressions of 2011 youth crime rates on 2006 percentages of single-mother families (SMFs) and single-father families (SFFs) by the prevalence of SMFs ($N = 433$).

2006 regressors	FTC11	FVC11	FPC11	MTC11	MVC11	MPC11
(a) Subsample of municipalities with low prevalence of SMFs (i.e., up to 11.5%; $N = 216$)						
Log. population	-0.30***	-0.27***	-0.11	-0.31***	-0.17*	-0.29***
Log. population density	-0.04	-0.02	-0.09	0.14	0.01	0.13
Population mobility	0.15	0.04	0.32***	0.17*	0.20*	0.14
Ethnic heterogeneity	0.13	0.09	0.11	-0.01	-0.00	-0.02
Population divorced	-0.16	-0.15	-0.10	-0.25**	-0.03	-0.27***
%SMFs	0.17*	0.13	0.09	0.16*	0.13	0.12
%SFFs	0.19**	0.17*	0.13	0.15*	0.04	0.20**
R^2	0.24	0.15	0.17	0.29	0.10	0.27
(b) Subsample of municipalities with high prevalence of SMFs (i.e., above 11.5%; $N = 217$)						
Log. population	-0.19**	-0.15*	-0.20**	-0.26***	-0.14*	-0.33***
Log. population density	-0.12	0.19**	-0.04	-0.12	-0.08	-0.11
Population mobility	-0.01	0.17*	-0.06	0.10	0.13	0.00
Ethnic heterogeneity	0.15*	0.17*	0.12	0.11	0.07	0.15*
Population divorced	-0.18**	-0.08	-0.16*	-0.15*	-0.07	-0.07
%SMFs	0.28***	0.31***	0.21**	0.34***	0.30***	0.35***
%SFFs	0.23***	0.15*	0.16*	0.16*	0.04	0.07
R^2	0.31	0.28	0.21	0.37	0.18	0.35

Note: $^*p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$. Female youth total crime rate (FTC11); Female youth violent crime rate (FVC11); Female youth property crime rate (FPC11); Male youth total crime rate (MTC11); Male youth violent crime rate (MVC11); Male youth property crime rate (MPC11). All coefficients presented in the table are standardized linear OLS regression coefficients.

The percentages of SMFs and SFFs with low income generally had weak effects on youth crime, and the effects appeared gender-specific (see Table 4). That is, the percentage of SMFs with low income had significant effects on female youth crime but not male youth crime, whereas the percentage of SFFs with low income had significant effects on male youth only. The percentage of SMFs with low income had significant conducive effects on female youth crime rates with $\widehat{\beta}$ s at 0.15, 0.13 and 0.13, but its effects on the male rates were small and nonsignificant at 0.04, 0.08 and −0.02. The effect $\widehat{\beta}$ s of the percentage of SFFs with low income were 0.13, 0.14 and 0.09 on the male rates, compared to 0.04, 0.01 and 0.09 on the female rates.

Given the generally weak effects of the low income variables, it followed that the inclusion of the low income variables did not reduce much the effects of %SMFs and %SFFs on youth crime. For example, the effect $\widehat{\beta}$ of %SMFs on female youth total crime was 0.43 before the inclusion of the low income variables, and it was reduced to 0.36 after the inclusion, representing a reduction of merely 16% in magnitude (see and compare the $\widehat{\beta}$ s in Tables 2 and 4). Similarly, the effect $\widehat{\beta}$ of %SMFs on the male youth total crime rate reduced slightly from 0.48 to 0.44 with the inclusion of the low income variables, representing just an 8% reduction in magnitude. Regarding the effect $\widehat{\beta}$ s of %SFFs, the reductions were even more trivial, from 0.20 to 0.19 on the female youth total crime rate and 0.14 to 0.13 on the male rate (see Tables 2 and 4).

On the basis that seven of the 12 effect $\widehat{\beta}$ s of the low income variables were statistically positive and statistically significant, one may conclude that there was some limited support for Hypotheses 5a and 5b. That is, low income had conducive effects on over half of the youth crime rates. Yet, even the statistically significant effects were generally weak. Therefore, one

Table 4
Regressions of 2011 youth crime rates on 2006 percentages of single-mother families (SMFs) and single father families (SFFs) with low income and other variables ($N = 433$).

2006 regressors	FTC11	FVC11	FPC11	MTC11	MVC11	MPC11
Log. population	-0.22***	-0.22***	-0.19***	-0.30***	-0.17***	-0.34***
Log. population density	-0.10	-0.13*	-0.05	-0.02	-0.03	0.01
Population mobility	0.02	0.09	0.04	0.11*	0.15**	0.08
Ethnic heterogeneity	0.09	0.14*	0.05	0.04	0.02	0.05
Population divorced	-0.20***	-0.12*	-0.16**	-0.19***	-0.06	-0.16***
%SMFs	0.36***	0.24***	0.28***	0.44***	0.35***	0.40***
%SFFs	0.19***	0.15**	0.13**	0.13**	0.02	0.11*
Low income in SMFs	0.15**	0.13*	0.13**	0.04	0.08	-0.02
Low income in SFFs	0.04	0.01	0.09*	0.13**	0.14**	0.09*
R^2	0.34	0.23	0.24	0.42	0.25	0.35

Note: $^*p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$. Female youth total crime rate (FTC11); Female youth violent crime rate (FVC11); Female youth property crime rate (FPC11); Male youth total crime rate (MTC11); Male youth violent crime rate (MVC11); Male youth property crime rate (MPC11). All coefficients presented in the table are standardized linear OLS regression coefficients.

may conclude that economic disadvantage, in terms of the prevalence of low income, played a relatively minor role in mediating or explaining the effects of SMFs and SFFs on youth crime.

4.3. Did excluding the 190 rural and other municipalities bias the results?

Given that the sample municipalities were characteristically more urban, one may legitimately ask the question as to whether the sample selection had biased the results. To answer the question, we combined the urban municipalities with the excluded municipalities and perform analyses similar to those presented in Tables 3 and 4 The results were presented in Tables 5 and 6.

The prevalence hypothesis was re-examined using the combined sample of 623 municipalities (i.e., 433 urban municipalities and 190 excluded municipalities). The results were presented in Table 5. Similar to what has been found before, in municipalities with low SMF prevalence (i.e., up to 11.5%; $N = 333$), the effects of %SMFs on the youth crime rates were small. For example, the effects were 0.19 and 0.14 with respect to female and male total youth crime rates (see Table 5). They were similar in strength compared to those found in the 433 urban municipalities (i.e., 0.17 and 0.16, respectively; see Table 3). In contrast, in municipalities with high SMF prevalence (i.e., above 11.5%, $N = 290$), the effects of %SMFs on the youth crime rates were substantially larger, with coefficients at 0.36 and 0.46 for female and male youth total crime rates (see Table 5). Thus, the results from the combined sample of 623 municipalities confirmed those reported earlier, lending strong support to the prevalence hypothesis.

Using the combined sample, the economic disadvantage hypothesis was re-examined, and the results were presented in Table 6. Similar to what has been found before, the effects of low income in SMFs and low income in SFFs were weak whereas the effects of %SMFs remained strong. For example, the effects of low income in SMFs on female and male youth total crime rates were only 0.10 ($p < 0.05$) and −0.01 (n.s.), and the effects of low income in SFFs on the rates were only 0.06 (n.s.) and 0.07 ($p < 0.05$) (see Table 6). On the other hand, the effects of %SMFs remained strong, suggesting that the economic disadvantage factors did not explain much of its effects. The effect of %SMFs on the female youth total crime rate was 0.37, and its effect on the male rate was 0.47 (the corresponding effects were 0.36 and 0.44, respectively, in the urban sample; see Tables 4 and 6).

In short, the results from the combined sample were consistent with the findings from the urban sample. It is therefore reasonable to state that as far as the major hypotheses are concerned, the exclusion of the 190 rural and other municipalities did not bias the findings.

4.4. The effects of the control variables

For a comprehensive perspective of the analysis, we include here a brief description of the effects of the control variables. Population size had reduction effects on youth crime rates, with $\widehat{\beta}$ s at −0.22 and −0.30 for female youth and male youth total crime rates (see Table 4). Similarly, divorce also had reduction effects on youth crime rates, with $\widehat{\beta}$ s at −0.20 and −0.19 for female youth and male youth total crime rates, respectively. In contrast, population mobility had rather weak effects on youth

Table 5
Re-examining the prevalence hypothesis using the combined sample: Regressions of 2011 youth crime rates on 2006 percentages of single-mother families (SMFs) and single-father families (SFFs) by the prevalence of SMFs ($N = 623$).

2006 regressors	FTC11	FVC11	FPC11	MTC11	MVC11	MPC11
(a) Subsample of municipalities with low prevalence of SMFs (i.e., up to 11.5%; $N = 333$)						
Log. population	-0.22***	-0.19**	-0.06	-0.22***	-0.15*	-0.21***
Log. population density	-0.04	0.04	-0.05	-0.01	-0.06	-0.00
Population mobility	0.14*	0.02	0.23***	0.15*	0.18**	0.12
Ethnic heterogeneity	0.13*	0.08	0.11	0.04	0.01	0.02
Population divorced	-0.20***	-0.14*	-0.08	-0.19**	-0.05	-0.22***
%SMFs	0.19**	0.16**	0.07	0.14*	0.15*	0.10
%SFFs	0.19***	0.05	0.06	0.07	-0.04	0.06
R^2	0.21	0.10	0.10	0.14	0.06	0.13
(b) Subsample of municipalities with high prevalence of SMFs (i.e., above 11.5%; $N = 290$)						
Log. population	-0.15**	-0.11	-0.18**	-0.19***	-0.11	-0.25***
Log. population density	-0.00	-0.11	0.05	0.02	0.02	-0.01
Population mobility	-0.06	0.04	-0.10	0.11	0.11	0.08
Ethnic heterogeneity	0.25***	0.23***	0.24**	0.08	0.02	0.10
Population divorced	-0.10	-0.07	-0.05	-0.12*	-0.11	-0.04
%SMFs	0.36***	0.37***	0.27***	0.46***	0.37***	0.46***
%SFFs	0.13*	0.09	0.01	0.09	0.05	0.02
R^2	0.25	0.23	0.14	0.43	0.25	0.37

Note: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$. Female youth total crime rate (FTC11); Female youth violent crime rate (FVC11); Female youth property crime rate (FPC11); Male youth total crime rate (MTC11); Male youth violent crime rate (MVC11); Male youth property crime rate (MPC11). All coefficients presented in the table are standardized linear OLS regression coefficients.

Table 6
Re-examining the economic disadvantage hypothesis using the combined sample: Regressions of 2011 youth crime rates on 2006 percentages of single-mother families (SMFs) and single father families (SFFs) with low income and other variables ($N = 623$).

2006 regressors	FTC11	FVC11	FPC11	MTC11	MVC11	MPC11
Log. population	-0.18***	-0.15***	-0.16***	-0.23***	-0.15***	-0.27***
Log. population density	-0.02	-0.04	0.01	-0.00	-0.02	0.01
Population mobility	-0.02	0.02	-0.01	0.11*	0.13**	0.09*
Ethnic heterogeneity	0.16***	0.15***	0.15**	0.05	0.01	0.06
Population divorced	-0.12***	-0.11**	-0.06	-0.16***	-0.09*	-0.13***
%SMFs	0.37***	0.34***	0.29***	0.47***	0.40***	0.42***
%SFFs	0.13**	0.07	0.01	0.08*	0.01	0.03
Low income in SMFs	0.10*	0.04	0.09*	-0.01	-0.01	-0.02
Low income in SFFs	0.06	0.02	0.10*	0.07*	0.12***	0.04
R^2	0.29	0.20	0.17	0.39	0.25	0.31

Note: $^*p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$. Female youth total crime rate (FTC11); Female youth violent crime rate (FVC11); Female youth property crime rate (FPC11); Male youth total crime rate (MTC11); Male youth violent crime rate (MVC11); Male youth property crime rate (MPC11). All coefficients presented in the table are standardized linear OLS regression coefficients.

crime rates, with $\widehat{\beta}$ s at 0.02 and 0.11 for female youth and male youth total crime rates. While the effects of these control variables are not directly relevant to the testing of the hypotheses, they point to the intricate relationships between population size, population mobility and divorce to the extent that they are potentially indicators of urbanization but have very different and even opposite effects on youth crime.

5. Discussion

5.1. Summary of findings

A summary of the hypotheses and findings are presented in Table 7. The strong effects of the single-mother family and the significant effects of the single-father family lent considerable support to the main hypothesis. With the much stronger effect of the single-mother family than the effect of the single-father family, the results provided strong support for the prevalence hypothesis (H4 & H4.1) and the economic disadvantage hypothesis (H5). The results provided very limited support to the same-sex hypothesis (H2b) and some limited support to the economic disadvantage sub-hypotheses (H5a & H5b) due to the weak effects of low income in SMFs and SFFs on youth crime. The results did not support the maternal hypothesis (H1) or the equality hypothesis (H3).

5.2. Theory and policy implications

The findings highlight the strong effects of single-parent families, particularly SMFs, on youth crime. Single-parent families have conducive effects on youth crime, perhaps due to the criminal involvement of youth from these families, or perhaps due

Table 7
A summary of the hypotheses and findings.

Hypotheses	Findings
Main hypothesis. The concentration of single-parent families has a conducive (i.e., criminogenic or statistically positive) effect on youth crime.	Supporting the hypothesis, both the concentrations of single-mother families (SMFs) and single-father families (SFFs) had significant positive effects on youth crime.
Maternal hypothesis. H1: The SFF concentration has a stronger conducive effect on youth crime than does the SMF concentration.	Contrary to H1, it was found that SMFs had a much stronger effect on youth crime than did SFFs.
Same-sex hypothesis. H2a: The SFF concentration has a stronger conducive effect on female youth crime than does the SMF concentration. H2b: The SMF concentration has a stronger conducive effect on male youth crime than does the SFF concentration.	Contrary to H2a, SFFs had a much weaker conducive effect on female youth crime. Regarding H2b, the findings were mixed. Compared to SFFs, SMFs had a stronger conducive effect on male youth crime. However, SMFs had similar effects on both male and female youth crime.
Equality hypothesis. H3: There is no difference in the effects of the concentrations of SMFs and SFFs on youth crime.	The findings were generally not supportive of H3.
Prevalence hypothesis. H4: The SMF concentration has a stronger conducive effect on youth crime than does the SFF concentration. H4.1: The SMF concentration has a stronger effect on youth crime in municipalities with a high SMF prevalence.	Both H4 and H4.1 received rather strong support. It was found that SMFs had a much stronger effect on youth crime than did SFFs especially in municipalities with a high SMF prevalence.
Economic disadvantage hypothesis. H5: Compared to SFFs, SMF concentration has a stronger conducive effect on youth crime. H5a: Low income in SMFs has a conducive effect on youth crime. H5b: Low income in SFFs has a conducive effect on youth crime.	The findings were consistent with H5. However, low income had only weak effects on youth crime for both SMFs and SFFs, thus providing only limited support for H5a and H5b.

to their adverse effect on the community's social control of the youth population at large. Even at the aggregate level, single-parent families are strong predictors of youth crime. Even more intriguing is the finding that low income explains little of the effects of single-parent families. That means in terms of theory development, one may have to search beyond low income or economic disadvantage. In terms of policy implication, the findings suggest that while attending to and alleviating the economic difficulties of single-parent families may be of paramount importance, it may not have much impact on reducing youth crime in the community. One may need to look into other measures that are beyond the economic or financial aspect of the single-parent families, perhaps in terms of cultural and social factors (e.g., such as gender norms, social tolerance as opposed to discrimination, and social integration as opposed to segregation).

At low prevalence, the proportion of SMFs already has quite a strong conducive effect on youth crime. But the effect almost doubles or even triples in high SMF prevalence municipalities. As the proportion of SMFs increases, its conducive effect on youth crime also increases. The phenomenon suggests that perhaps as the proportion of SMFs becomes larger and more concentrated in the community, their impact on the community is greater by their sheer number. As Wilson's (1987) argument suggests, an increase in the number of the underclass in a community may cause the depletion of the community's resources and its ability to effect positive changes. In terms of theory development, this finding suggests that the level of prevalence per se is an important accelerating factor that may explain the effect of single-parent families on youth crime. In terms of policy implication, it cautions that as the number of SMFs grows, the community and its members, if left to their own devices, may become less effective in handling the related problems.

5.3. Limitations and future research

The present study has examined the effects of the prevalence and low income of SMFs and SFFs on youth crime. There are still many factors relevant to the conditions of SMFs and SFFs that have not been explored. For example, some SMFs may receive their main source of incomes from public assistance whereas other SMFs may receive their main source of incomes from work, be it part-time or full-time work. Presumably those who earn their incomes from employment may contribute to the community more positively compared to those who receive their incomes from public assistance. It may be worth studying how these different sources of incomes as well as their respective productive activities may affect youth crime and possibly other outcomes.

Furthermore, the present study examined only three major groups of youth crime, namely, total, violent and property offenses. It has not examined how single-parent families may affect specific offenses. For example, it is not clear as to whether the single-mother family has the similar effect on robbery, a rather serious violent offense, as opposed to vandalism, a relatively minor property offense. Nor do we know for sure whether the evidence from examining the specific offenses will still provide the strong support for the prevalence hypothesis. As noted, most research studies that offer the comparison between the effects of the single-mother family and the single-father family on delinquency tend to be based on survey data, and the specific offenses covered in survey tend to be relative minor offenses. Recent research studies that cover serious offenses such as robbery or homicide using aggregate-level official data such as the Uniform Crime Report often include only the single-mother family, not as an independent variable but only as an indicator of concentrated disadvantage. Therefore, there is a need for future research to examine as to how the single-mother family, in comparison with the single-father family, may affect the specific offenses, especially the more serious offenses, at the aggregate level.

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