
SOCIAL AND ECONOMIC STRESS, CHILD NEGLECT AND JUVENILE DELINQUENCY

Don Weatherburn and Bronwyn Lind
with assistance from Simon Ku

This is a project supported by a grant from the
Criminology Research Council.
The views expressed are the responsibility of the authors
and are not necessarily those of the Council.

NSW Bureau of Crime Statistics and Research
Attorney General's Department

1997

Published by the NSW Bureau of Crime Statistics and and Research

Attorney General's Department

Level 8

St James Centre

111 Elizabeth Street

Sydney

ISBN 0 7313 1130 2

PREFACE

It has long been known that officially recorded rates of most forms of crime are higher in economically and socially disadvantaged areas. For a time criminologists were divided over whether this relationship reflected the effect of economic and social disadvantage on crime or social biases in the operation of law enforcement and criminal justice agencies. It is now clear that both of these views are correct. Police arrest and court appearance rates for certain categories of offence (such as drug offences and public order offences) are strongly affected by law enforcement policy. On the other hand, economic and social disadvantage do seem to increase the rate of many serious and commonly reported offences, such as vehicle theft; break, enter and steal; robbery; and assault.

Amongst those who accept that economic and social disadvantage increases crime, the debate has shifted to how these factors exert their effects. The conventional view has been that economic and social disadvantage increase the motivation to offend. But there are a number of findings which are difficult to reconcile with this view. Crime rates do not always rise and fall in tandem with unemployment. There is little evidence that unemployment prompts large numbers of otherwise law-abiding people to become involved in crime. Most juveniles who become involved in crime do so long before they enter the labour market. Finally it is hard to understand why economic and social disadvantage would be associated with non-utilitarian forms of crime, such as assault.

A growing body of research evidence drawn from studies of individual families suggests that economic and social disadvantage increases the risk of child neglect and other forms of poor parenting such as harsh, erratic and inconsistent discipline. These types of parenting are known to increase the risk of juvenile involvement in crime. To date, however, there have been few systematic attempts to see how much of the effect of economic and social disadvantage on aggregate-level variation in crime can be explained in terms of their effect on rates of child neglect and/or abuse. The present study set out to address this issue. The results reinforce the findings of individual-level studies. Economic and social disadvantage appears to increase the rate of juvenile participation in crime mainly by increasing the rate of child neglect.

These findings highlight the importance to long-term crime prevention of reducing the level of poverty and unemployment, enhancing the social supports available to those who face poverty and unemployment, and capitalising on early intervention programs known to improve the quality of parenting behaviour.

Dr Don Weatherburn
Director

July 1997

ACKNOWLEDGEMENTS

We gratefully acknowledge the assistance and cooperation of both the NSW Department of Community Services and the NSW Department of Juvenile Justice. Without the data supplied by these Departments we could not have undertaken this study. Trish McGaulley from the Department of Community Services provided data on reported neglect and abuse and has shown continued interest in our research. Ernie Zibert from the Department of Juvenile Justice provided data on Children's Court appearances.

We also wish to thank the Criminology Research Council who supported this study with a research grant.

CONTENTS

INTRODUCTION	1
Economic stress and the parenting process	2
The role of social stressors in child maltreatment	6
The role of social supports in child maltreatment	9
Child neglect, child abuse and juvenile involvement in crime	10
Aim of this research	12
METHOD	13
Sources of data	13
Definitions and calculation of the measures used	14
Neglect and abuse	14
Juvenile participation in crime	14
Measures of social and economic stress	15
Postcodes	16
Analysis	16
Regression analysis	16
Path analysis	17
RESULTS	19
Description of the data	19
Neglect	19
Abuse	19
Juvenile participation in crime	20
Measures of social and economic stress	21
Analysis of data for urban areas	22
Correlations	22
Social and economic stress as predictors of neglect, abuse and juvenile participation in crime	22
Neglect as a predictor of juvenile participation in crime	26
Neglect and social and economic stress as joint predictors of juvenile participation in crime	27
Abuse and social and economic stress as joint predictors of juvenile participation in crime	28
Predictors of juvenile participation in property crime	28
Predictors of juvenile participation in violent crime	30
Neglect and abuse as joint predictors of juvenile participation in crime	31
Path analysis	31
Analysis of data for rural areas	33
Correlations	33
Social and economic stress as predictors of neglect, abuse and juvenile participation in crime	34
Neglect as a predictor of juvenile participation in crime	36

CONTENTS continued

Abuse as a predictor of juvenile participation in crime	37
Models for other measures of juvenile participation in crime	37
Path analysis	39
SUMMARY AND DISCUSSION	42
NOTES	49
REFERENCES	51
APPENDIX	55

EXECUTIVE SUMMARY

Findings for urban areas

- Juvenile participation in crime (measured as rates of Children's Court appearances for property or violent offences) was positively correlated with the following measures of social and economic stress:
 - poverty (measured as the percentage of households with an income under \$16,000);
 - unemployment (measured as the percentage of unemployed in the labour force);
 - single parent families (measured as the percentage of families with a single parent and dependent offspring);
 - residential stability (measured as the percentage of families with a different address five years earlier); and
 - crowded dwellings (measured as the percentage of dwellings with more than 1.5 residents per bedroom).
- Rates of reported child neglect and child abuse were also positively correlated with these measures of social and economic stress.
- Juvenile participation in crime was positively correlated with rates of reported neglect and abuse.
- These correlations indicate that postcodes with high levels of social and economic stress also tend to have high rates of child neglect and abuse and high rates of juvenile offenders.
- Using regression analysis, poverty, single parent families and crowded dwellings were found to be the best explanatory variables for juvenile participation in crime. Together these three measures accounted for 56 per cent of the variation across postcodes in the level of juvenile participation in crime.
- The rate of child neglect, on its own, was found to explain 57 per cent of the variation in juvenile participation in crime across postcodes. When juvenile court appearances for property and violent offences were considered separately, the rate of child neglect on its own accounted for 58 per cent of the variation across postcodes in the rate of juvenile participation in *property* crime and 49 per cent of the variation across postcodes in the rate of juvenile participation in *violent* crime.
- Neglect was found to account for most of the explained variation in juvenile participation in crime, when included in a regression model as a joint predictor with poverty, single parent families and crowded dwellings. Similar results were found when abuse replaced neglect but this finding was probably due to the high correlation between neglect and abuse.
- A path analysis showed that neglect was by far the most important causal influence on juvenile participation in crime.
- Taken as a whole, these findings indicate that poverty, single parent families and crowded dwellings affect the level of juvenile participation in crime mainly by increasing the rate of child neglect.

- The findings indicate that, assuming other factors remained unchanged, an increase of 1,000 additional neglected children would result in an additional 256 juveniles involved in crime. Alternatively, and again assuming other factors remained unchanged, an increase of 1,000 additional poor families would result in an additional 141 juveniles involved in crime.
- The increases in juvenile court appearances resulting from such increases in neglect or poverty would be 466 for each additional 1,000 neglected children or 257 for each additional 1,000 poor families. The increase in criminal offending would be substantially larger given that only a small proportion of offences result in court appearances.

Findings for rural areas

- The pattern of results was generally similar to that found in urban areas, in that neglect accounted for most of the explained variation in juvenile participation in crime across postcodes. However, most of the relationships were weaker.
- In the presence of social stress measures (single parent families and crowded dwellings) neither poverty nor unemployment were significant predictors of juvenile participation in crime.
- Single parent families and crowded dwellings together accounted for 24 per cent of the variation across postcodes in the rate of juvenile participation in crime.
- The rate of child neglect, on its own, accounted for 22 per cent of the variation across postcodes in the rate of juvenile participation in crime. Neglect on its own explained 21 per cent of the variation across postcodes in the rate of juvenile participation in *property* crime and 22 per cent of the variation across postcodes in the rate of juvenile participation in *violent* crime.
- The path analysis for rural postcodes indicated that crowded dwellings was as important as neglect as a causal influence on juvenile participation in crime. For juvenile participation in violent crime crowded dwellings was more important than neglect. This finding may be an artefact of weaker measurement of the level of neglect in rural areas.

Conclusion

- The study concludes by arguing that policies designed to reduce the level of economic stress or attenuate its effects, and early intervention programs designed to reduce the risk of child neglect, have an important role to play in long-term crime prevention.

INTRODUCTION

Most people have the impression that impoverished neighbourhoods generate disproportionately large and persistent crime problems. In the main, research supports this impression. In his review of the aggregate-level relationship between unemployment and crime, for example, Chiricos (1987) observed that, at levels of aggregation below the national level, the percentage of cross-sectional tests for an association between unemployment and property crime which showed a positive result ranged between 81 per cent (for Standard Metropolitan Statistical Area comparisons) and 93 per cent (for intra-city comparisons). For violent crimes the pattern of results was weaker but still strong. Sixty-nine per cent of the intra-city comparisons he reviewed exhibited a significant positive association between unemployment and crime. This tendency for crime rates to be higher in economically deprived neighbourhoods is not only found when economic deprivation is measured through unemployment. A similar pattern of results has been obtained from studies measuring economic deprivation through income (Box 1987; Belknap 1989) and also from studies which measure economic deprivation by rankings of neighbourhoods in terms of social status (Braithwaite 1979).

Traditional explanations for this relationship have tended to view it in terms of offender motivation. In other words, they all generally assume that economic disadvantage, in one way or another, motivates individuals affected by that disadvantage to offend. This is as true of social opportunity theorists such as Cloward and Ohlin (1960) and Merton (1968), who argue that disadvantaged individuals experience greater tension between their institutionalised goals and the legitimate avenues available to achieve them, as it is of classical economic theorists, such as Becker (1968), who argue that disadvantaged individuals are more heavily involved in crime than more affluent individuals because the opportunity costs of involvement in crime rise with an individual's income and social status. The assumption that economic disadvantage motivates individuals to offend is no less firmly embedded in more recent theories of crime. It is a feature, for example, of both the learning theory of crime proposed by Wilson and Herrnstein (1985) and the theory of reintegrative shaming proposed by Braithwaite (1988).

Notwithstanding its popularity, there are a number of facts which are difficult to reconcile with the view that the relationship between economic disadvantage and crime arises because economic disadvantage motivates individuals to offend. Although the balance of evidence favours the view that economic stress increases crime, a large number of studies have failed to find any relationship between unemployment or income and crime (Chiricos 1987; Belknap 1989). Some studies, on the other hand, find a relationship which prevails at some time periods and not at others (Chiricos 1987; Vaughn 1991). There is very little individual-level evidence to support the thesis that unemployment or a drop in income prompts otherwise law-abiding individuals to become involved in crime (Blumstein et al. 1986). Finally, the peak age for onset of criminal activity appears to pre-date entry into the labour market (and, in some cases, entry into high school) by a large margin (Farrington et al. 1990).

In this report we examine an alternative explanation for the relationship between economic disadvantage and crime. We propose that, rather than offender motivation, parental neglect of children is the principal pathway through which the effects of economic disadvantage are transmitted. We begin with an examination of the research

evidence linking economic and social stress and parental neglect or abuse of children and of the evidence linking neglect with involvement in crime. We then describe our own research which assesses the relationships between social and economic disadvantage, reported rates of child neglect and abuse, and reported rates of juvenile participation in crime, across postcode areas in New South Wales (NSW).

Throughout this report we use the term *economic stress* in the sense of economic deprivation which results in financial hardship, regardless of whether its effects include emotional stress. We also use the term *social stress* to describe social factors which impose hardship on families.

ECONOMIC STRESS AND THE PARENTING PROCESS

Aggregate-level studies almost universally show a strong positive association between measures of economic stress and reported rates of child neglect and child abuse (Garbarino & Sherman 1980; Spearly & Lauderdale 1983; Young & Gately 1988; National Center on Child Abuse and Neglect 1988; Garbarino & Kostelny 1992; Coulton & Pandey 1992; Durkin et al. 1994; Krishnan & Morrison 1995; Kotch et al. 1995; Coulton et al. 1995; Chaffin, Kelleher & Hollenberg 1996). Although Australian research examining the relationship between child maltreatment is far more limited than overseas research, cross-sectional analyses of the relationship between socioeconomic status and official reports of child maltreatment in Australia show exactly the same pattern (Young, Baker & Monnone 1989).

It is sometimes argued that the relationship between economic stress and child maltreatment simply reflects the fact that the poor are subjected to greater official surveillance than their counterparts who are better off. In fact only one study has been reported which provides evidence in support of the surveillance hypothesis. Hampton and Newberger (1985) compared official reports of maltreatment with maltreatment reported to researchers working for the first national (United States) study of the incidence and prevalence of child abuse. They found income affected the likelihood of child abuse being reported to protection authorities. They did not find, however, that the association between economic stress and child maltreatment could be explained away by the association between socioeconomic status and the likelihood of child abuse being officially reported.

As Baumrind (1994) has pointed out, there is general consensus within the scholarly literature that the relationship between economic stress and child maltreatment is in fact a causal one. Three lines of evidence can be adduced to support this conclusion. Firstly, the effects of economic stress on parents are consistent with the expectation that it would increase the risk of child maltreatment. Secondly, a relationship between economic stress and child maltreatment can be found even among families with very low income. Thirdly, a relationship between economic stress and the level of nurturance toward children can be found among studies which rely on self-report or direct observation of families for information about parental behaviour rather than on official records.

The effects of economic stress are certainly consistent with the expectation that it would increase the risk of child maltreatment. Low income has been found to greatly increase the risk of depression in women (Dore 1993). Depression among parents with dependent children has been shown, in turn, to lead to lowered tolerance for child misbehaviour and the use of highly authoritarian, overcontrolling responses (Lahey et al. 1984). Rates

of substance abuse are also generally much higher among low socioeconomic groups than among middle or upper socioeconomic groups. Drug abuse has also been shown to increase the risk of child neglect and abuse (Kelley 1992; Dore, Doris & Wright 1995; Tomison 1996a).

Giovannoni and Billingsley (1970) sought to test the thesis that higher rates of child neglect and abuse are observed among lower socioeconomic groups only because they are subjected to greater official surveillance by comparing rates of neglect among two populations of low-income families. One group was drawn from the caseloads of public health nurses and the other was drawn from the caseloads of the Protective Services Units at the San Francisco office of the Department of Social Services. The second group constituted the sample of neglecting families. Public health nurses rated the families from their caseloads on six areas of family functioning. Those families rated as having no problem in any of the six areas constituted the sample of 'adequate' families. Those rated as having problems in all six areas were grouped together as 'potentially neglectful'. For the purposes of assessing the effect of income on child neglect, Giovannoni and Billingsley then split each of the three groups into those earning less than \$2,000 per year and those earning between \$2,000 and \$4,000 per year. Proceeding in this way they found a significant association between extreme economic stress and neglect. Sixty-three per cent of the 'adequate' mothers were in extreme economic stress, while 84 per cent of the 'potentially neglectful' and 88 per cent of the neglectful mothers could be so described. Similar results in relation to physical abuse have been obtained in Australia by Vinson, Berreen and McArthur (1989). They found that reported rates of child physical abuse were 2.5 times higher in the bottom four per cent of postcodes, ranked in terms of socioeconomic status, than in the six per cent of postcodes ranked immediately above.

The most compelling evidence against the surveillance hypothesis, however, comes from studies which have found evidence of a relationship between economic stress and neglectful or abusive parenting without relying on official records. At least eight such studies have been conducted. Given the importance of these studies to the arguments we develop below we will examine them in some detail.

Elder, Van Nguyen and Caspi (1985) examined the effects of income loss during the Great Depression on parenting behaviour using data from the Oakland Growth Study, a longitudinal study of 167 Californian children born between 1920-1921. Economic loss was measured by splitting the group into two, those whose families had lost at least 35 per cent of their income during the Great Depression and those whose families lost nothing or less than 35 per cent of their income. The behaviour of parents toward their children was assessed through personal interviews designed, among other things, to rate parental behaviour on four dimensions (rejecting, exploiting, indifferent, positive). Paternal behaviour was significantly correlated with elevated levels of paternal rejection and indifference and lowered levels of paternal support both for sons and daughters. Economic loss appeared to have less effect on maternal than paternal behaviour.

Lempers, Clark-Lempers and Simons (1989) examined the effects of a rural economic recession in a mid-western rural community in the United States. The subjects in the study were 622 school students enrolled in schools throughout the community. Measures of economic stress were obtained by interviewing students about recent income-related changes in their family's lifestyle. Measures of parental nurturance and

consistency in administering discipline were obtained through a questionnaire dealing with changes in parental behaviour during the previous six months, as perceived by the students. Lempers et al. found a strong negative association between the perceived level of financial hardship experienced by the family over the last six months and the perceived level of parental nurturance. This effect obtained for both sons and daughters. They also found a strong relationship between the perceived level of financial hardship and the use of inconsistent discipline by the parents. The children of families subjected to greater economic stress were much more likely to rate the disciplinary practices of the parents over the preceding six months as inconsistent.

Silbereisen, Walper and Albrecht (1990) examined the effect of income loss on parental stress and family integration amongst a sample of 134 families drawn from a longitudinal survey of youth in Berlin. The site of their study is of particular significance because of the rapid economic change which occurred in West Germany in the ten to fifteen years prior to the conduct of the first wave of the survey in 1982-1983. At that time the West German unemployment rate was nine per cent and a large proportion of those unemployed were young people with dependent children. To assess the effects of economic stress the researchers constructed three categories of family based on the income loss sustained by the family over the year preceding the survey. The 'no loss' group were those who experienced an income loss equal to or less than 5 per cent. The 'moderate loss' group were those who experienced an income loss of up to 25 per cent. The 'high loss' group were those who lost more than 25 per cent of their income. Parental strain was measured through parental responses to questions pertaining to the perceived level of stress experienced by the parents over the past year. Family integration was measured through a series of self-report questions dealing with the level of friction and conflict in the family. Silbereisen et al. found that parents who suffered high income loss exhibited higher levels of stress and had more poorly integrated families than those who did not suffer such loss. In fact, when compared with families in the 'no loss' group, significantly higher levels of parental stress were found even among families which suffered moderate income loss.

McLoyd and Wilson (1990) examined the relationship between economic hardship and single parent family functioning in a sample of 155 low-income single parent families recruited through the local school and Department of Social Services. Measures of economic hardship were obtained both from data on income and from self-reports of financial hardship provided by the mothers. Measures of nurturant versus punitive parenting behaviour were obtained from self-reports by the mothers who were asked to indicate on a five-point scale how often they used nine different methods to punish and reward their children (such as verbal compliment, show of affection, scolding, taking away privileges). The mothers participating in the study also completed questionnaires designed to measure their levels of anxiety and depression. McLoyd and Wilson found that income and perceived economic stress significantly increased the level of anxiety in the mother, which in turn reduced the level of nurturance she exhibited toward her children. The more efforts mothers saw themselves as having to make to balance family needs and family income, the more distressed and the less nurturant they became.

Larzelere and Patterson (1990) examined the effect of socioeconomic status on parental monitoring and discipline through interviews with a sample of 206 fourth grade boys drawn from the Oregon Youth Study. Socioeconomic status was measured using both the parents' educational level and a standard scale of occupational prestige. Although these measures of economic stress are less direct than those employed in the studies

reviewed above, it is not unreasonable to assume that average income levels were lower among the lower socioeconomic status families. Measures of parental monitoring were based on interviews with the boys and their parents. The interviews with the boys touched on issues such as the extent to which they told their parents when they would be back from an outing, whether they checked in after school and whether they left a note to say where they were going. The interviews with the parents touched on issues such as the amount of time spent with their son, the amount of time their son was unsupervised, whether the son was allowed out after dark and whether the parents talked to their sons about their plans for the next day. Measures of parental discipline were designed to assess its consistency and appropriateness and were based on parental interviews and on direct observation. Three measures of discipline were constructed. One tapped the extent to which the parents followed up with threatened punishments and/or engaged in different patterns of discipline according to their mood. The second tapped the extent to which parents engaged in ambiguous discipline, such as making vague or ambiguous threats. The third tapped the extent to which parents engaged in discipline which was consistent, firm and reasoned. Larzelere and Patterson found that there was a significant association between socioeconomic status (as measured by occupational status) and both parent and observer ratings of the level of parental supervision. There was also a significant association between socioeconomic status and the three measures of parental discipline. Parents from low socioeconomic status backgrounds were more likely to engage in harsh, erratic and inconsistent discipline.

Conger et al. (1992) examined the influence of economic stress on (among other things) parenting behaviour amongst a sample of 205 middle-class two-parent families, a large proportion of whom had been adversely affected by the rural recession in the United States in the mid-1980s. The families were recruited through a large number of public and private schools. Economic hardship was assessed both through objective measures, such as income, family debt to asset ratio, unstable work record, and subjective measures, such as self-reports of financial pressure and ability to purchase desired goods and services. Separate measures of parental nurturance and hostility were obtained both from self-reports and from trained observers who videotaped the families discussing a range of family problems and issues put to them by the observer. The observers also rated the level of conflict between the parents. Measures of parental depression were also obtained, both through standardised questionnaires and observer ratings. Conger et al. found that both objective and subjective measures of economic hardship were directly related to ratings of depressed mood in both parents while ratings of depressed mood, in turn, were inversely related to the level of nurturance shown by parents toward their children. This effect held up when measures of nurturance were based on self-reports and when they were based on ratings by observers.

Sampson and Laub (1994) assessed the impact of economic stress on discipline style, maternal supervision of children and parent-child attachment by reanalysing data originally collected by the Gluecks for their classic study *Unraveling Juvenile Delinquency*. The Glueck data were obtained from extensive personal interviews with the families of 500 delinquent boys aged 10-17 and 500 matched controls born between 1924 and 1935, raised in the slum environments of central Boston. Sampson and Laub based their measures of economic stress on average weekly income and the family's reliance on outside aid. Three measures of family functioning were constructed. These were style of discipline (inconsistent, erratic or harsh punishment), level of parental supervision (of children) and parent-child attachment. Family economic stress was found to be

positively correlated with the use of erratic/harsh discipline and negatively correlated with the levels of parent-child attachment and maternal supervision. This was true even after controls were introduced for residential mobility, family size, family disruption, maternal employment, ethnicity, parental deviance and parental instability. Furthermore, even when controls for child misbehaviour were introduced, the relationship between family economic stress and the use of erratic/harsh discipline and level of parent-child bond remained strong.

Harris and Marmer (1996) examined the impact of economic stress on the emotional and behavioural involvement of parents with their adolescent children using data from the National Survey of Children, a panel study of a nationally representative sample of children interviewed in 1976, 1981 and 1987. Their analysis was based on 748 children who lived continually in a two-parent family at all three waves of the study. Because they monitored the families of the children over all three waves of the study they were able to examine the effect of both chronic and temporary economic stress. Families were classified as 'chronically poor' if their income remained within 150 per cent of the (United States) economic stress line at all three waves of the study and 'never poor' if their income remained above 150 per cent of the economic stress line over the same period. Families who experienced economic stress at only one of the three survey waves were classed as 'temporarily poor'. Poverty was also measured at each wave of the survey by whether or not the families received welfare. Parent-child emotional involvement was measured through interviews with the child on matters such as how close he/she felt to the father/mother and the level of affection provided by the parents. Parent-child behavioural involvement was measured by the number of activities engaged in by parents and child which were perceived to be mutually satisfying. Harris and Marmer did not find any effects of temporary economic stress but did find a strong effect of chronic economic stress (whether measured by household income or welfare receipt) on the level of emotional and behavioural involvement between fathers and their adolescent children. They also found that when families received welfare, mothers were less likely to be behaviourally involved with their children.

Taken together, the findings from these studies provide strong evidence that the aggregate-level evidence linking economic stress to reported rates of child maltreatment is not just an artefact of higher rates of detection of neglect and/or abuse in poorer areas and that economic stress really does disrupt the parenting process in ways which encourage child neglect and abuse. Increased irritability, arbitrary discipline, conflict and physical punishment appear to be common parental responses to economic stressors (Vondra 1990). Yet it should not be thought that economic stress exerts its effects on parenting in isolation from other factors impinging on the family. The effects of economic stress can be exacerbated or ameliorated by a range of social and individual factors.

THE ROLE OF SOCIAL STRESSORS IN CHILD MALTREATMENT

Two obvious sources of additional strain on poor families with dependent children are the lack of a partner and/or the presence of large numbers of dependent children. In their review of relevant literature Giovannoni and Billingsley (1970) argued that, after socioeconomic status, sole parent status and the number of children per household were the most frequently observed correlates of child neglect and/or abuse. Many early studies of the link between child maltreatment and family structure, however, failed to control for other factors which might influence child maltreatment. Evidence supportive

of the importance of sole parent status as a correlate of child neglect and/or abuse has since emerged from a variety of studies employing appropriate controls (Cotterell 1986; Young & Gately 1988; Creighton & Noyes 1989; Garbarino & Kostelny 1992; Coulton & Pandey 1992; Nelson, Saunders & Landsman 1993; Pett, Vaughan-Cole & Wampold 1994; Kotch et al. 1995; Chaffin, Kelleher & Hollenberg 1996; Coulton et al. 1995; Zuravin & DiBlasio 1996).

It has sometimes been observed that the effects of single parent family status on child maltreatment diminish or appear insignificant in the presence of controls for psychiatric problems or substance abuse (e.g. Kotch et al. 1995; Chaffin, Kelleher & Hollenberg 1996). This finding is not necessarily in conflict with the assumption that single parent family status increases the risk of child neglect and/or abuse. Psychological problems such as drug abuse, depression and anxiety are common reactions to the pressures of poverty and single parent family status. There is every reason to expect these problems to adversely affect the quality of parenting, and in so doing to mediate at least some of the effect of single parent family status on child neglect and/or abuse. We should hardly be surprised, then, to find that regression analyses employing single parent family status as a predictor of child maltreatment find that its effect is attenuated or absent in the presence of variables tapping psychological problems such as depression, anxiety and substance abuse.

Large family size is another well-documented risk factor for child neglect and abuse. In their prospective longitudinal study Kotch et al. (1995) found that the number of children in a household was a predictor of child maltreatment even in the presence of controls for maternal depression, lower maternal education, infant illness, receipt of Medicaid, separation of a mother from her own mother, emotional support given to a mother by her own mother and maternal experience of violence. In a separate prospective longitudinal study Chaffin, Kelleher and Hollenberg (1996) confirmed the importance of household size as an independent predictor of both child neglect and abuse even in the presence of controls for (the child's) age, marital status, maternal substance abuse and maternal depression. This latter study is of particular significance because it relied on personal interviews rather than official reports to determine whether neglect or abuse was present in the family.

Other studies relying on official records have obtained similar results. Zuravin and DiBlasio (1996) examined the factors which best discriminated between neglecting, abusing and control families all receiving benefits under a United States Government program known as Aid to Families with Dependent Children (AFDC). They found that the number of dependent children was the best single discriminator both of the difference between neglecting and control families, and of the difference between abusive and control families. Nelson, Saunders and Landsman (1993) conducted a similar discriminant analysis designed to identify the factor which best discriminated parents reported for child neglect but in which the neglect had not been confirmed, parents newly reported for child neglect where the neglect had been confirmed and parents with chronic histories of confirmed child neglect. The number of children in the family emerged as a strong discriminator of all three groups. The importance of crowded households as a predictor of child maltreatment has also been strongly confirmed at the aggregate level. Zuravin (1986) examined the relationship between per cent residential density (defined as per cent of dwellings with 1.51 or more persons per room) and reported rates of child abuse and neglect across 202 census tracts in Baltimore, Maryland. The results of her analysis indicated that residential density was

significantly related to reported rates of child neglect and abuse in the presence of controls for race and socioeconomic class.

Although family structure and family size are among the most frequently cited correlates of child neglect and abuse, a range of other factors have also been implicated. Rates of neglect and abuse are generally higher in areas with higher levels of geographical mobility (Spearly & Lauderdale 1983; Garbarino & Kostelny 1992; Coulton & Pandey 1992; Krishnan & Morrison 1995; Coulton et al. 1995). There is also evidence that rates of child neglect and/or abuse are higher amongst disadvantaged minority groups, such as blacks and Mexican-Americans (Spearly & Lauderdale 1983; Garbarino & Kostelny 1992; Coulton & Pandey 1992; Chaffin, Kelleher & Hollenberg 1996; Coulton et al. 1995; and Krishnan & Morrison 1995). Both these effects hold up in the presence of controls for family economic status and family structure.

It seems likely that geographical mobility and ethnicity derive their significance as predictors of child maltreatment at least partly from the fact that they both signal defects in the strength of neighbourhood social supports. Most researchers examining the effect of geographic mobility as a predictor of child maltreatment maintain that families in neighbourhoods with high levels of mobility have fewer material and emotional resources to call on to ameliorate the stresses of parenting and poverty. Similar arguments have been put in relation to ethnic minority groups (see, for example, Spearly & Lauderdale 1983, p. 95). In the case of ethnic minority groups this disruption to social networks stems from at least two sources. Firstly, the family and kinship structure of indigenous groups in the United States, Canada and Australia suffered massive disruption in the wake of European invasion. The appropriation of land by Europeans for pastoral use typically resulted in whole communities of indigenous people being uprooted from their traditional lands. In Australia the disruption to indigenous life was further exacerbated with the forcible removal of Aboriginal children from their families, ostensibly for their benefit but with generally calamitous results (Human Rights and Equal Opportunity Commission 1997).

Among the black population in the United States, different processes appear to have produced similar results. According to Martin and Martin (1978) the urban environment has had a destructive effect on the supportive functions of the black extended family. This disruption to the social networks of black families appears to have been further exacerbated during the 1980s by the deindustrialisation of central cities and the exodus of middle- and upper-income black families from the inner city (Sampson & Wilson 1995, p. 42).

Family structure, family size, geographical mobility and ethnicity are the principal exogenous sources of social stress on families with dependent children, but there are also a range of other factors which have been found to exacerbate the risk of child neglect and/or abuse. As we intimated a moment ago, these include depression (Hubbs-Tait et al. 1994; Kotch et al. 1995; Chaffin, Kelleher & Hollenberg 1996; Gaudin et al. 1996; Zuravin & DiBlasio 1996) and substance abuse (Davis 1990; Kelley 1992; Jaudes, Ekwo & Van Voorhis 1995; Dore, Doris & Wright 1995; Harrington et al. 1995; Chaffin, Kelleher & Hollenberg 1996). In her review of the literature on risk factors associated specifically with child neglect, Salmelainen (1996) also cites factors such as the level of conflict between parents, deficiencies in maternal problem-solving skills and the presence in the family of a child with a handicap or developmental disability. Furthermore, Tomison (1996a, 1996b) cites a body of evidence supporting the hypothesis that parents exposed as children to neglect and/or abuse are at increased risk (regardless of their circumstances) of neglecting or abusing their own children.

THE ROLE OF SOCIAL SUPPORTS IN CHILD MALTREATMENT

Since the lack of adequate social support appears to exacerbate the effects of economic stress on child maltreatment, we might expect the provision of support to buffer its effects. Although studies examining this issue often fail to employ adequate statistical controls, their findings generally confirm this expectation. Several studies, for example, have shown that the social networks of neglecting or abusive mothers are smaller than those of non-maltreating mothers matched in terms of at least some of the key factors known to independently affect the risk of child maltreatment. Gaudin et al. (1996) compared the social network size of non-neglecting and neglecting parents who had been matched on household income and a range of other demographic characteristics (but had not been matched in terms of the number of children or the mother's education). Asked to list 'persons important in your life' the primary caregivers from the control group listed significantly more members than did providers from the neglect group. Cooley (1996) obtained similar findings in her comparison of neglecting parents with controls matched on the basic poverty level, number of dependent children and the mother's race and age (but not matched in respect of mother's education level and family structure). Neglecting and abusing parents generally listed fewer close friends and relatives and also indicated that they experienced fewer contacts on average from each member of their social network than did their matched control counterparts.

The social network differences between maltreating and non-maltreating parents are mirrored in their perceptions of the extent of social support enjoyed by each group. Lacharité, Ethier and Couture (1996), for example, found that neglectful mothers in two-parent families generally rated their partners as less supportive and their relationship with their partner less satisfactory than mothers not reported for neglect who had been matched on maternal and paternal age, number of children, family occupational status, family income, marital duration and biological status of the father. Similar findings have been reported by those comparing perceived levels of social support among maltreating and non-maltreating parents from sources other than the marital partner (Cotterell 1986; Cooley 1995, 1996; Caliso & Milner 1994). These differences in social support appear to be linked, at least in part, to variations in neighbourhood social structure. Garbarino and Sherman (1980) examined various forms of neighbourhood interaction in two neighbourhoods which had been matched in terms of socioeconomic and racial profile but which had very different reported rates of child maltreatment. Compared with the low-rate neighbourhood, mothers in the high-risk neighbourhood tended to assume more exclusive and direct responsibility for child care, less frequently used children in the neighbourhood as playmates for their own children, engaged in fewer neighbourhood exchanges, made less use of neighbourhood resources and rated their neighbourhood more poorly as a place to live.

There is some limited evidence that direct material support may act as a buffer against the effects of economic stress on child maltreatment. In their ecological study of the structural determinants of child maltreatment, Spearly and Lauderdale (1983) found that county rates of child abuse were lower in counties which had higher average monthly AFDC payments than in counties with lower average monthly payments. This effect held up even after controlling for differences between counties in household income, family structure and the number of dependent children aged less than six years. Cooley (1995, 1996) in the studies cited earlier, also found that neglecting mothers received fewer material and instrumental resources from friends and relatives than mothers in non-neglecting or non-abusing control groups. While these studies raise

the possibility that direct financial or material support may act as a buffer against the effects of economic stress on child maltreatment their results should be treated with some caution. In the studies by Coohy material support was just one among a number of factors which discriminated between maltreating and non-maltreating families. The evidence presented by Spearly and Lauderdale in relation to income support, on the other hand, is open to other interpretations. It is possible, for example, that the counties spending smaller amounts per capita on AFDC in their study also provided a smaller range of non-material services to families with dependent children.

Whatever the relative importance of various forms of social support as buffers against the effects of economic stress on parenting, it is plain that the effects of economic stress on child maltreatment cannot be considered in isolation from the effects of social stressors and supports. As Belsky (1993) points out, child maltreatment is determined not just by the level of household income available to a family but by the overall balance of stressors and supports they experience. The available evidence suggests that poverty and unemployment are probably less likely to lead to child maltreatment in families which have strong social supports but more likely to lead to maltreatment among parents or caregivers whose parenting capacity is already weakened by factors such as lack of support from a partner, a weak social network, psychological disorder, substance abuse, prior history of maltreatment, lack of parenting skills or the presence of a maladjusted or disabled child. If we accept this argument we should expect poor communities in general to have higher rates of child neglect and abuse but the strength of the cross-sectional relationship between economic stress and child maltreatment will depend on the extent to which those communities can call upon resources which attenuate or buffer the effects of poverty. We turn, then, to the question of whether child neglect and abuse can be expected to influence the risk of involvement in crime and, if so, by what mechanism or mechanisms.

CHILD NEGLECT, CHILD ABUSE AND JUVENILE INVOLVEMENT IN CRIME

Loeber and Stouthamer-Loeber (1986) have carried out what remains the most thorough and comprehensive review of the relevant literature. They grouped studies of family factors and delinquency into four basic paradigms: *neglect*, *conflict*, *deviant behaviours and attitudes* and *disruption*.¹ The results of studies within each of these paradigms were separately analysed according to whether they involved concurrent (i.e. cross-sectional) or longitudinal designs and comparison or normal samples.² In order to assess the relative importance of variables examined within each of these paradigms as predictors of delinquency, they constructed a common measure of predictive efficacy called RIOC (relative improvement over chance). This index ranged between zero (no predictive efficacy) and 100 per cent (perfect predictive efficacy) and was able to be calculated from data published in most of the studies they reviewed. Where the data from studies within the above-mentioned paradigms could not be converted to RIOC values (e.g. where measures of group differences were based on *t* or *F* values) Loeber and Stouthamer-Loeber employed a standard effect size estimate, called Cohen's *d*.³

The results of Loeber and Stouthamer-Loeber's analysis revealed that social control variables (i.e. variables associated with the neglect paradigm) consistently outperformed variables from the other paradigms as predictors of juvenile delinquency. Amongst the highest median RIOC values in concurrent comparison samples were parent-child involvement (61.5 per cent), supervision (66.3 per cent), discipline (73.5 per cent) and

parental rejection (62.6 per cent). The meta-analysis revealed that the ranking of variables based on the measure of *d* for these studies was very similar. It also revealed that the ranking of RIOC values for the longitudinal studies (all of which involved normal samples) was very similar to that for concurrent studies, this ranking being: parents' involvement with children (31 per cent), parental rejection of children (35.8 per cent) and supervision (36.4 per cent). Loeber and Stouthamer-Loeber also found evidence that the strength of these control variables grew rather than dissipated over time. As they put it: 'in the concurrent studies, based on normal samples, the median RIOC for supervision and rejection was 14.6 per cent and 24 per cent, respectively, compared with 36.4 per cent and 35.8 per cent in the longitudinal studies'.

The importance of social control variables to the onset of delinquency has since been confirmed in numerous other studies. Simons, Robertson and Downs (1989), employing a panel design and a sample of 300 adolescents chosen from drug treatment programs and the general community, found that parental rejection predicted delinquency even after controls were introduced for other family process variables, such as family conflict, family religiosity and maternal employment. Widom (1989), employing a prospective matched control design (with matching on race, sex, age and socioeconomic status), found that children registered as having been neglected by their parents were significantly more likely as adults to have a criminal record. Employing a stratified random sample of 1,000 New York students and controlling for race/ethnicity, social mobility, sex, socioeconomic status and family structure, Smith and Thornberry (1995) replicated the Widom study and found that officially recorded child neglect was strongly correlated with both officially recorded and self-reported crime. Similar results have been obtained in Australia by Mak (1994). Larzelere and Patterson (1990) found that the level of parental monitoring and the consistency of parental discipline among a sample of 206 male high school students predicted both official and self-reported delinquency, even in the presence of controls for socioeconomic status. Weintraub and Gold (1991), employing a representative sample of 1,395 American adolescents, found that parental monitoring predicted delinquency even after controls were introduced for age, sex and the strength of the affectional relationship between parents and children. Thornberry et al. (1991) conducted a panel study of 987 students and found that the strength of a student's attachment to his or her parents was inversely related to delinquency, even in the presence of controls for the level of attachment to school. Essentially similar results have also been obtained in cross-sectional studies by Martens (1992), Barnes and Farrell (1992), Rankin and Kern (1994) and Burton et al. (1995), in a retrospective longitudinal study by Sampson and Laub (1994), and in a prospective longitudinal study by Johnson et al. (1995).

While child neglect has emerged as one of the most important antecedents of juvenile involvement in crime, it would be a mistake to assume that child abuse is unrelated to such involvement. There are several reasons for this. Firstly, while the antecedents of child neglect and abuse differ somewhat, there is also substantial overlap in their correlates. The incidence of both problems, for example, would appear to be higher among families exposed to economic stress (Martin & Walters 1982; Spearly & Lauderdale 1983). Secondly, problems of child neglect and abuse are frequently found together in a family (Ney, Fung & Wickett 1994). Thirdly, while there is evidence that child abuse, *per se*, is a weaker predictor of juvenile involvement in crime than child neglect (Loeber & Stouthamer-Loeber 1986), those who are exposed to child abuse are nonetheless at increased risk of involvement in crime (McCord 1983; Widom 1989; Kakar 1994).

AIM OF THIS RESEARCH

We have seen that there is ample evidence, both from individual-level studies and aggregate-level studies, that economic stress, through a variety of mechanisms, increases the likelihood that parents will neglect or abuse their children. The individual-level studies show both that (1) children who are neglected or abused are likely to belong to families which have suffered economic stress and (2) children in poor families are more likely to be neglected or abused than those in wealthier families. These effects are attenuated in families facing social stress but ameliorated in families with strong social supports. The aggregate-level studies also show a strong positive association between measures of social and economic stress and reported rates of child neglect and abuse. That is, they show that areas with high rates of social and economic stress tend to have high rates of child neglect and abuse.

Evidence for the causal link between child neglect and/or abuse and crime, however, is based predominantly on individual-level studies. These studies show that children who are neglected or abused are more likely to become involved in crime than those who are not neglected and also that those who do become involved in crime are highly likely to have been neglected. These effects hold up both for crime committed in pursuit of material goals and crime which is purely 'expressive' in nature. Yet, while individual-level research studies make a convincing case that parental neglect is one of the causal pathways through which economic and social stress influence individual offending behaviour, they are incapable of addressing the question of whether the aggregate-level association between economic stress and crime is mediated mainly by neglect. This can only be demonstrated by showing that aggregate crime rates are influenced by aggregate rates of neglect.

The aim of this research, then, was to test four basic hypotheses related to this issue. They are as follows:

- (1) There is a positive relationship between the level of social and economic stress in an area and its level of juvenile participation in crime.
- (2) There is a positive relationship between the level of social and economic stress in an area and its rates of child neglect and abuse.
- (3) The effects of social and economic stress on juvenile participation in crime are mediated mostly through the effects of social and economic stress on rates of child neglect and abuse.
- (4) The relationship posited in (3) holds up for participation in both property and violent offences.

METHOD

The data for our analysis consist of measures of child neglect, child abuse, juvenile participation in crime and selected socioeconomic measures. The following sections describe the sources of the data, the definitions of the measures used, how these measures were calculated, and how the data were analysed.

SOURCES OF DATA

The measures of neglect and abuse were based on alleged neglect or abuse reported to the NSW Department of Community Services. The Department provided data relating to reports of child neglect or abuse, notified during the time period 1 July 1986 to 30 June 1991. For each child reported, the data items consisted of a unique child identifier; the date of notification of the neglect or abuse, the child's date of birth and gender, the postcode of residence of the child at the time of notification, and the type of abuse or neglect. All notifications were included in the data set, whether or not the neglect or abuse was confirmed by Department of Community Services personnel.

These measures of neglect and abuse are the only readily available measures at postcode level. It should be noted, however, that being based on reports to authorities, they are likely to underestimate the true levels of neglect and abuse. Furthermore, if the reporting rate varies from one area to another, there may be some bias in the relativities of these measures across areas. Nevertheless, the overseas research evidence cited earlier in this report indicates that we can be reasonably confident that reported rates of neglect and abuse are good indicators of the actual levels of neglect and abuse for the purpose of making comparisons across areas.

The measures of juvenile participation in crime were based on appearances before the Children's Court for property or violent offences. The NSW Department of Juvenile Justice provided records of appearances before the Children's Court for all cases finalised between 1 July 1990 and 30 June 1995. The record for each court appearance included a unique child identifier; the date the matters were finalised by the court; the offence type of the most serious charge dealt with; and the date of birth, gender and postcode of residence of the child. All court appearances were included in the data set, regardless of the outcome of the court case (i.e. regardless of whether the juvenile was convicted or acquitted).

Not all offenders are apprehended by police and not all of those who are apprehended end up appearing in court. Hence the juvenile court appearance rate for an area clearly only includes a small proportion of the juvenile offenders in that area. Nevertheless, court appearance rates should provide a reasonably good indicator of offender rates for comparing areas with one another.

Each of the data sets covered a five-year period. However, given the nature of the hypothesis being tested (i.e. that delinquency is caused by child neglect and/or abuse) the data for child neglect and abuse were deliberately drawn from an earlier time period than the data for juvenile participation in crime.

Socioeconomic data were obtained from the *Community Profile*, a set of tabulations of 1991 census data published by the Australian Bureau of Statistics (ABS).

DEFINITIONS AND CALCULATION OF THE MEASURES USED

All the data measures were calculated for each postcode in NSW (with some exceptions as discussed below). Because postcodes differ in their resident populations, all measures were expressed as proportions of the relevant population.

Neglect and abuse

The measures of neglect and abuse used in this study were the rates, per population of children under 16, of children reported for neglect and children reported for abuse.

As noted above, the data set of reported neglect and abuse covered a five-year time period. During this period some children were reported for neglect and/or abuse many times. Each notification for the same child may have involved either neglect or abuse or both, and further, may not always have had the same postcode of residence recorded for the child. For the purpose of the analysis it was necessary for the observations from different postcodes to be independent of each other. To meet this requirement, in calculating the rates of neglect (or abuse), each child could only be associated with one postcode and could be counted only once, regardless of the number of notifications for that child. (It should be noted, however, that the same child could be counted in both the neglect rate and the abuse rate, as these were two separate measures calculated for each postcode.)

To calculate the rates of reported neglect and abuse for each postcode, each child was assumed to belong to the postcode recorded for the child's *earliest* notification in the data set, whether that notification was for neglect or abuse. If, for example, a child was reported on two different occasions, the earlier notification being for neglect (only) and the later one for abuse (only), and if the child lived in postcode A at the time of the first notification and in postcode B at the time of the second notification, then that child was included in the calculated *neglect* rate for postcode A and the calculated *abuse* rate for postcode A; the child was not included in either rate for postcode B.

To obtain separate measures for neglect and abuse, each notification was classified (using the Department of Community Services' summary classifications) as either (1) neglect or emotional abuse only, or (2) physical or sexual abuse only. Notifications where a child was reported for both neglect and abuse were excluded from the rate calculations.

The denominator for the rate calculations was the population of 0-15 year olds resident in the postcode at the 1991 census. The measures of neglect and abuse were therefore as follows for each postcode:

neglect: the number of children with at least one notification for neglect or emotional abuse only (between 1 July 1986 and 30 June 1991) divided by the number of 0-15 year olds resident in the postcode at the 1991 census;

abuse: the number of children with at least one notification for physical or sexual abuse only (between 1 July 1986 and 30 June 1991) divided by the number of 0-15 year olds resident in the postcode at the 1991 census.

Juvenile participation in crime

Rates, per head of population, of appearances in the Children's Court for either property or violent offences, were used as the measures of juvenile participation in crime. Separate rates were also calculated for property offences only and for violent offences

only. The population in the rate calculations was the number of 10-17 year olds resident in the postcode at the 1991 census.

The appendix lists offences classified as 'property offences' and 'violent offences' for the purposes of this study. Court appearances where the most serious offence dealt with was not one of these offences were excluded.

As with the neglect and abuse data, it was possible for the same person to have more than one court appearance in the five-year time period and for that person to live in different postcode areas at the times of these different court appearances. Once again each person was uniquely associated with only one postcode, namely the postcode for the earliest court appearance in the data set, regardless of whether the most serious offence at that appearance was a property or violent offence.

The measures of juvenile participation in crime for each postcode were therefore as follows:

juvenile crime participation rate: the number of juveniles with at least one court appearance where the most serious offence was a property or violent offence (between 1 July 1990 and 30 June 1995) divided by the number of 10-17 year olds resident in the postcode at the 1991 census;

juvenile property crime participation rate: the number of juveniles with at least one court appearance where the most serious offence was a property offence (between 1 July 1990 and 30 June 1995) divided by the number of 10-17 year olds resident in the postcode at the 1991 census;

juvenile violent crime participation rate: the number of juveniles with at least one court appearance where the most serious offence was a violent offence (between 1 July 1990 and 30 June 1995) divided by the number of 10-17 year olds resident in the postcode at the 1991 census.

Measures of social and economic stress

Two measures of economic stress were used: extremely low household income (as an indicator of poverty) and unemployment. Both of these measures were readily available from census data and are direct measures of financial hardship placed on a family.

The direct measures of social stress identified in the literature are single parent families, residential stability and family size. Census data provided readily accessible measures for the first two of these factors. For family size there were two possible measures available from the 1991 census. The first was the proportion of 'large' families. However, because it was not possible to determine the proportion of families with a specified number of children greater than two, a 'large' family had to be defined as a family with two or more children. Not surprisingly, having two or more children in a family did not prove to be a good measure of social stress (it was negatively correlated with neglect). The second possible measure of family size was of crowded dwellings, derived from combining information on the number of bedrooms per dwelling with information on the number of residents of the dwelling.

The measures of social and economic stress obtained from the 1991 census for each postcode were therefore as follows:

poverty: households with an annual income of less than \$16,000, as a proportion of all households;

unemployment: unemployed persons, as a proportion of the labour force;

single parent families: single parent families with dependent offspring, as a proportion of all families;

stability: families who had a different address five years earlier, as a proportion of all families;

crowded dwellings: dwellings with more than 1.5 persons per bedroom,⁴ as a proportion of all dwellings.

Poverty and *unemployment* were the selected measures of economic stress. *Single parent families*, *stability* and *crowded dwellings* were the selected measures of social stress.

POSTCODES

Data were obtained for the whole State of NSW, using the postcode as the basic unit of area. For various reasons, as set out below, a number of postcodes were excluded from the data sets. The postcodes excluded were:

- postcodes for interstate locations;
- postcodes for military installations, universities, and mail sorting houses;
- postcodes with populations of less than 100 for *either* the age group 0-15 or the age group 10-17;⁵
- postcodes with no population data from the 1991 census. In some cases this occurred because the ABS merged a 'secondary' postcode with a 'primary' postcode: in these circumstances all data for the 'secondary' postcode (for neglect, abuse and delinquency) were recoded to the 'primary' postcode.

Postcodes for areas in the Sydney Statistical Division⁶ or in the Local Government Areas of Newcastle City or Wollongong City were classified as *urban*. All remaining postcodes were classified as *rural*. In total there were data for 262 postcodes in the urban data set and for 241 in the rural data set.

ANALYSIS

The data were analysed separately for urban and rural areas. The main method of analysis was fitting linear regression models. A path analysis was also undertaken.

Regression analysis

The hypotheses were tested by fitting multiple linear regression models to the data. The response variable in these models was either *neglect* or *abuse* or one of the juvenile crime participation measures. Each regression model expressed the specified response variable as a linear function of one or more predictor variables.

For the tests of hypotheses associated with multiple linear regression, it is a requirement that the response variable be normally distributed. As we shall see later, the frequency distributions of our response variables all indicate non-normality: all have long upper tails. It was therefore necessary to apply a transformation to the response variables before fitting the regressions. All the response variables are proportions, for which an appropriate transformation is the logistic transformation, where y is replaced by its logit

function, $\ln[y/(1-y)]$. This transformation was applied to the response variables and the normality of the transformed data was checked by examining normal probability plots. After applying the logistic transformation, all response variables were found to be normally distributed. In all regression models the predictor variables were left untransformed.

Because the variance of a proportion is dependent on the sample size on which it is based, parameters in the regression models were estimated using weighted least squares.⁷

For each linear regression model fitted, the adequacy of the fitted model was assessed in a number of ways. Variance inflation factors were calculated to check for multicollinearity.⁸ The normality of the residuals from each fitted model was checked by examining probability plots of the residuals. Finally, studentised residuals were examined to check for outliers. Generally, there were at most one or two outliers for any fitted regression model. No outliers were removed because the focus was on hypothesis testing rather than prediction and, for this purpose, the influence of one or two outliers was deemed to be negligible.

Postcodes with zero values for the response variable were excluded from the analysis. Excluding these postcodes was considered to be more appropriate than including them as data points equal to zero.⁹

Path analysis

Following the regression analysis, a path analysis was conducted to examine the relative importance of the pathways in our hypothesised causal model.

Path analysis is an analytical technique often used in the social sciences to assess the strength of posited causal relationships. It is important to note that a path analysis cannot and does not *prove* that hypothesised causal relationships are true; it simply provides a means of assessing the relative strength of causal relationships, *assuming* they are true.

For our path analysis we used the best linear predictor method described by Kang and Seneta (1980). Using this method, no assumptions need be made about the variables in a path analysis other than that they are random (i.e. not controlled as in an experiment) and that the sample size is relatively large (so that large sample theory can be applied to use the sample correlation matrix as an estimate of the population correlation matrix).

The first step in a path analysis is to hypothesise the causal relationships for a set of variables. Those variables which have no direct causes from within the set of variables are said to be *exogenous*. Those variables which do have direct causes are said to be *endogenous*. Following Kang and Seneta (1980), the next step is to express each endogenous variable as a linear function of its causes. For this purpose all variables are converted to standardised form, so that each has zero mean and unit variance. To explain the variation in the endogenous variable which is not explained by its direct causes, each of the linear functions or 'causal equations' should include a residual variable and this residual variable should be considered as an additional exogenous variable in the set of variables. There is, however, no need for a constant term in the causal equations (because all the variables have zero mean when standardised).

The best linear predictors for the causal equations are estimated using least squares. The least squares estimates of the coefficients (of the causal variables) in the causal

equations can be calculated directly from the sample correlation matrix. These estimated coefficients are called the 'path coefficients'. Because all variables are standardised, the path coefficient for a specified causal variable can be considered as a measure of the unit change expected in the predicted variable for each unit change in the specified causal variable, if all other causal variables were held constant. Hence the relative strength of different causal influences is assessed by the relative size of the path coefficients.

The causal relationships are usually shown in a path diagram with single-headed arrows showing the direction of each causal relationship and curved double-headed arrows connecting each pair of exogenous variables (including the residual variables). Path coefficients are entered on the single-headed arrows and pairwise correlations on the double-headed arrows. No double-headed arrows need be drawn between pairs of exogenous variables which are uncorrelated with each other. It is a property of best linear predictors that the residual variable is uncorrelated with other predictor variables in the same linear equation. Hence no double-headed arrows need be drawn between residual variables and exogenous variables which appear together as predictors in the same causal equation.

RESULTS

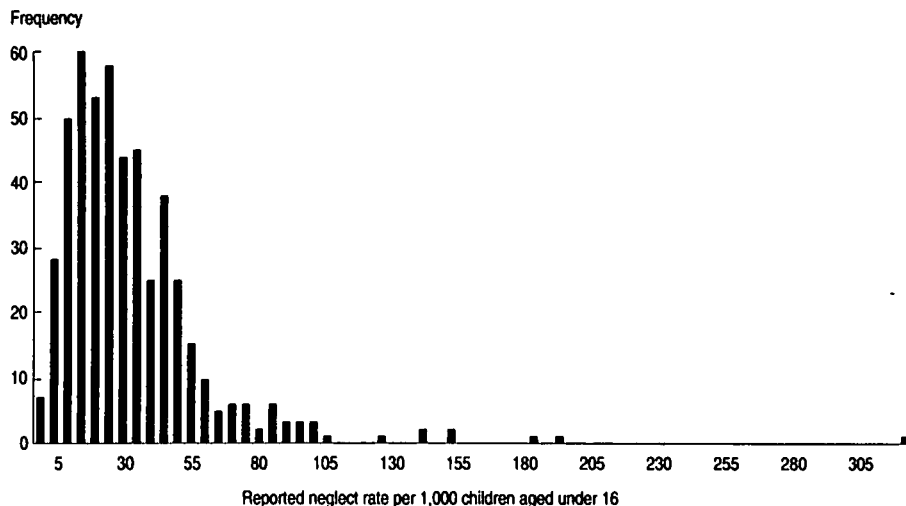
DESCRIPTION OF THE DATA

Neglect

There were 501 postcodes with non-zero rates of reported child neglect. Overall, the rates of children reported for neglect between 1 July 1986 and 30 June 1991 ranged from 0.3 to 315.7 per thousand children, with an average of 35.6 and a standard deviation of 27.8. The highest rate of 315.7 was exceptionally high, the next highest being 193.0. Ninety per cent of postcodes had rates of less than 60.6. Figure 1 shows the frequency distribution for all postcodes (both urban and rural) with non-zero rates of child neglect.

In urban areas there were 261 postcodes with non-zero rates of reported child neglect. The rates of children reported for neglect in urban areas ranged from 0.3 to 185.0 per thousand children, with an average of 30.8 and a standard deviation of 25.2. In rural areas (240 postcodes with non-zero rates) the range was 3.7 to 315.7, with an average of 40.8 and a standard deviation of 29.5.

Figure 1: Frequency distribution for rates of children reported for neglect, NSW postcodes, July 1986 to June 1991

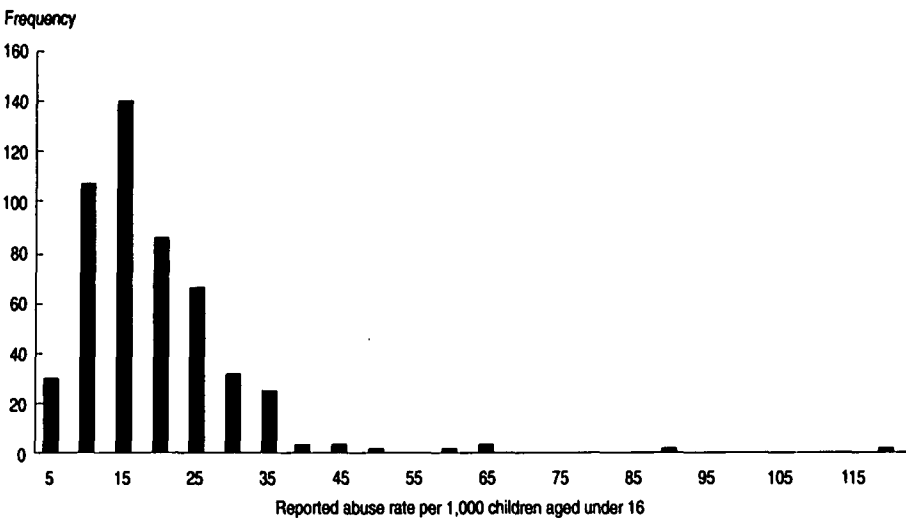


Abuse

There were 498 postcodes with non-zero rates of reported child abuse. Overall, the rates of children reported for abuse between 1 July 1986 and 30 June 1991 ranged from 0.3 to 118.6 per thousand children, with an average of 16.1 and a standard deviation of 10.7. Ninety per cent of postcodes had rates of less than 28.3. Figure 2 shows the frequency distribution for all postcodes with non-zero rates of child abuse.

In urban areas (261 postcodes with non-zero rates) the rates of children reported for abuse ranged from 0.3 to 62.7 per thousand children, with an average of 14.5 and a standard deviation of 9.7. In rural areas (237 postcodes with non-zero rates) the range was 2.2 to 118.6, with an average of 17.9 and a standard deviation of 11.5.

Figure 2: Frequency distribution for rates of children reported for abuse, NSW postcodes, July 1986 to June 1991

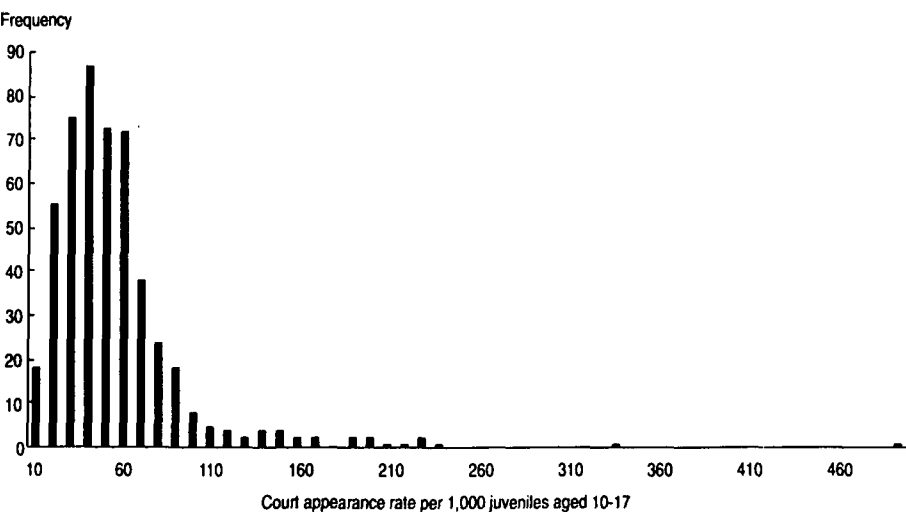


Juvenile participation in crime

There were 502 postcodes with non-zero Children’s Court appearance rates for property or violent offences. Overall, the rates of juvenile participation in crime between 1 July 1990 and 30 June 1995 ranged from 4.9 to 496.3 per thousand juveniles, with an average of 50.6 and a standard deviation of 42.2. Ninety per cent of postcodes had juvenile crime participation rates of less than 84.1.

Figure 3 shows the frequency distribution for all postcodes with non-zero rates of Children’s Court appearances. It is clear that the distribution is very skewed. The figure shows that there are seven postcodes with crime participation rates greater than 200 per thousand juveniles and the two highest rates are exceptionally high (334.9 and 496.3).

Figure 3: Frequency distribution for rates of juveniles with at least one court appearance for a property or violent offence, NSW postcodes, July 1990 to June 1995



In urban areas there were 262 postcodes with non-zero Children's Court appearance rates for property or violent offences. The rates in urban areas ranged from 6.1 to 231.9 per thousand juveniles, with an average of 45.3 and a standard deviation of 32.2. In rural areas (240 postcodes with non-zero rates) the range was 4.9 to 496.3, with an average of 56.3 and a standard deviation of 50.3.

There were 502 postcodes with non-zero Children's Court appearance rates for property offences. Juvenile participation in property crime ranged from 2.5 to 392.6 per thousand juveniles, with an average of 41.7 and a standard deviation of 34.6.

There were 476 postcodes with non-zero Children's Court appearance rates for violent offences. Juvenile participation in violent crime ranged from 0.6 to 266.7 per thousand juveniles, with an average of 16.5 and a standard deviation of 20.0.

Measures of social and economic stress

For each of the measures of social and economic stress, Table 1 shows the mean, the range and the 90th percentile value for the State as a whole and for rural and urban areas.

Table 1: Descriptive statistics for measures of social and economic stress

	<i>Poverty</i> (%)	<i>Unemployment</i> (%)	<i>Single parent families</i> (%)	<i>Stability</i> (%)	<i>Crowded dwellings</i> (%)
All NSW (503 postcodes)					
Mean	22.8	11.7	6.6	34.5	16.4
Minimum	2.0	2.2	2.4	11.3	4.7
Maximum	56.4	45.7	35.9	62.1	38.0
90th percentile	32.9	18.9	9.6	43.2	22.2
Urban NSW (262 postcodes)					
Mean	18.3	10.2	6.5	34.6	16.6
Minimum	2.0	2.2	2.6	19.4	4.7
Maximum	56.4	45.7	35.9	62.1	38.0
90th percentile	26.7	16.1	9.7	43.9	24.6
Rural NSW (241 postcodes)					
Mean	27.7	13.3	6.7	34.5	16.1
Minimum	8.0	3.8	2.4	11.3	8.1
Maximum	50.8	32.0	17.8	56.1	32.3
90th percentile	34.3	21.2	9.4	43.1	20.1

ANALYSIS OF DATA FOR URBAN AREAS

Correlations

Table 2 shows, for urban areas, the matrix of pairwise correlations between all the variables of interest, that is, the measures of neglect, abuse, juvenile participation in crime and of social and economic stress. All of these correlations are of the variables measured in their original scales (i.e. before any transformations made for the regression analyses).

From this table of correlations it can be seen that juvenile participation in crime is significantly positively correlated with each of the measures of social and economic stress. This result is consistent with the finding of an association between crime and social disadvantage, as documented in many research studies and referred to earlier in this report.

Neglect and abuse are also significantly positively correlated with each of the measures of social and economic stress. These correlations indicate that rates of child neglect and child abuse tend to be higher in areas with higher rates of social and economic stress.

Most importantly, it is clear that juvenile participation in crime is highly correlated with both neglect and abuse, indicating that rates of juvenile participation in crime are generally higher in areas with higher rates of neglect and abuse.

As they are based on reports to authorities, rates of recorded neglect, abuse and juvenile participation in crime may vary from one area to another merely because there are different rates of reporting in different areas. Earlier in this report we drew attention to the surveillance hypothesis, that is, the thesis that such rates may be higher in poorer areas merely because neglect, abuse and juvenile participation in crime are more easily discovered in poor areas. If this were the case, one would not expect to find significant correlations if the analysis were restricted only to poor areas. To test the surveillance hypothesis, the correlations were recalculated for the ten per cent of urban postcodes which had the highest proportions of low-income households (i.e. the top 26 urban postcodes ranked on *poverty*). These revised correlations are presented in Table 3. Neglect, abuse and juvenile participation in crime remain significantly correlated with *poverty* even for this restricted set of postcodes.

Social and economic stress as predictors of neglect, abuse and juvenile participation in crime

Regression models were fitted to the data to determine which combination of the measures of social and economic stress was best in explaining juvenile participation in crime. Table 4 shows the results of fitting two multiple linear regression models: the first (Model 1) includes all the socioeconomic measures as predictors of juvenile participation in crime; the second (Model 2) includes only *poverty*, *single parent families* and *crowded dwellings* as predictors. As noted earlier, the response variable in the regression models was transformed using the logistic transformation and the parameters were estimated using weighted least squares.

Table 4 shows that in Model 1 the regression coefficient for *unemployment* is not significantly different from zero and the regression coefficient for *stability* is close to non-significance (at the five per cent level of significance). Model 2 excludes both these variables. As there is very little difference in the R^2 values between the two models, it

Table 2: Pearson correlation coefficients for urban postcodes

	<i>Neglect</i>	<i>Abuse</i>	<i>Juvenile participation in crime</i>	<i>Juvenile participation in property crime</i>	<i>Juvenile participation in violent crime</i>	<i>Poverty</i>	<i>Unemployment</i>	<i>Single parent families</i>	<i>Stability</i>	<i>Crowded dwellings</i>
Neglect	1.00									
Abuse	0.90	1.00								
Juvenile participation in crime	0.80	0.74	1.00							
Juvenile participation in property crime	0.78	0.71	0.99	1.00						
Juvenile participation in violent crime	0.73	0.69	0.93	0.90	1.00					
Poverty	0.61	0.52	0.65	0.64	0.58	1.00				
Unemployment	0.59	0.54	0.63	0.61	0.55	0.65	1.00			
Single parent families	0.57	0.54	0.58	0.58	0.55	0.57	0.64	1.00		
Stability	0.17	0.19	0.24	0.25	0.16	NS	NS	0.30	1.00	
Crowded dwellings	0.29	0.31	0.37	0.35	0.34	0.34	0.65	0.21	NS	1.00

Note: 'NS' indicates that the correlation was not significantly different from zero ($p \leq 0.05$).

Table 3: Pearson correlation coefficients for 10 per cent of urban postcodes with highest proportion of low-income households

	<i>Neglect</i>	<i>Abuse</i>	<i>Juvenile participation in crime</i>	<i>Juvenile participation in property crime</i>	<i>Juvenile participation in violent crime</i>	<i>Poverty</i>	<i>Unemployment</i>	<i>Single parent families</i>	<i>Stability</i>	<i>Crowded dwellings</i>
Neglect	1.00									
Abuse	0.91	1.00								
Juvenile participation in crime	0.69	0.58	1.00							
Juvenile participation in property crime	0.66	0.54	0.99	1.00						
Juvenile participation in violent crime	0.59	0.49	0.93	0.93	1.00					
Poverty	0.54	0.59	0.74	0.73	0.76	1.00				
Unemployment	NS	NS	NS	NS	NS	0.44	1.00			
Single parent families	NS	NS	NS	NS	NS	0.52	0.76	1.00		
Stability	NS	NS	NS	NS	NS	NS	NS	NS	1.00	
Crowded dwellings	NS	NS	NS	NS	NS	NS	0.72	0.56	NS	1.00

Note: 'NS' indicates that the correlation was not significantly different from zero ($p \leq 0.05$).

is clear that Model 2 explains virtually the same amount of variation in juvenile participation in crime as does Model 1. We can therefore conclude that, in the presence of the other socioeconomic variables, neither *unemployment* nor *stability* is a necessary explanatory variable for juvenile participation in crime. It is clear, however, that it is necessary to retain each of the remaining socioeconomic variables as predictors of juvenile participation in crime. The results from fitting Model 2 show that 56 per cent of the variation in the rates of juvenile participation in crime across urban postcodes is explained by the levels of *poverty*, *single parent families* and *crowded dwellings* in those postcodes.

**Table 4: Juvenile participation in crime, urban areas (261 postcodes)
Models with socioeconomic measures as predictors**

Terms in the model	Model 1		Model 2	
	Parameter estimate	p	Parameter estimate	p
Intercept	-4.67	0.0001	-4.47	0.0001
Poverty	2.29	0.0001	2.34	0.0001
Unemployment	0.73	0.3548	-	-
Single parent families	6.75	0.0001	7.64	0.0001
Stability	0.77	0.0494	-	-
Crowded dwellings	2.34	0.0001	2.82	0.0001
R ² for fitted model	0.57		0.56	

If, as we hypothesise, social and economic stress influence juvenile participation in crime because they are causal factors for child neglect and abuse, then we would expect *poverty*, *single parent families* and *crowded dwellings* to be good predictors of child neglect and abuse. Table 5 presents the results of fitting linear regression models using these variables as predictors of neglect and abuse.

**Table 5: Neglect and abuse, urban areas (261 postcodes)
Models with socioeconomic measures as predictors**

Terms in the model	Neglect		Abuse	
	Parameter estimate	p	Parameter estimate	p
Intercept	-4.85	0.0001	-5.27	0.0001
Poverty	1.51	0.0004	0.97	0.0110
Single parent families	12.78	0.0001	10.11	0.0001
Crowded dwellings	1.84	0.0001	1.58	0.0001
R ² for fitted model	0.60		0.54	

It is clear from Table 5 that these measures of social and economic stress are predictors of neglect and abuse. Indeed, the R² values for these two models show that *poverty*, *single parent families* and *crowded dwellings* explain about the same amount of the variation in the rates of child neglect and abuse as they do for the variation in juvenile participation in crime.

Figure 4: Rates of juvenile participation in crime and neglect in urban postcodes

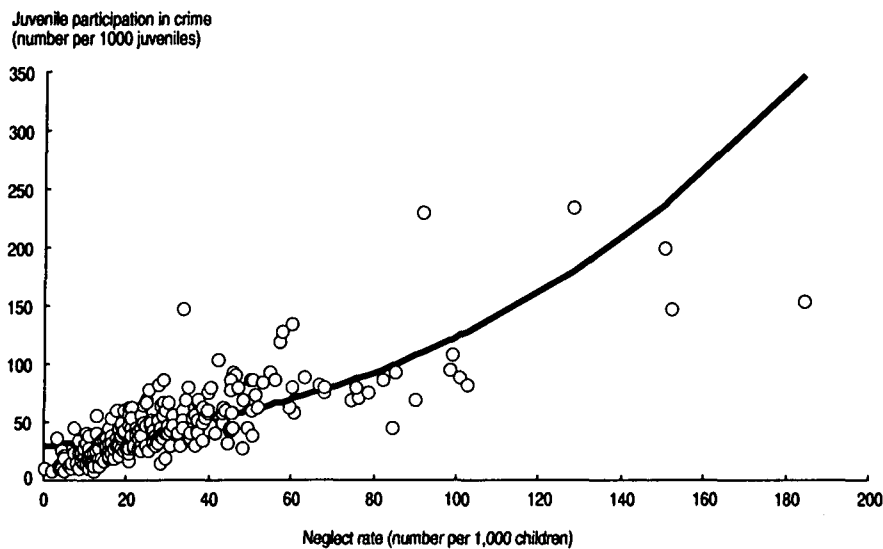
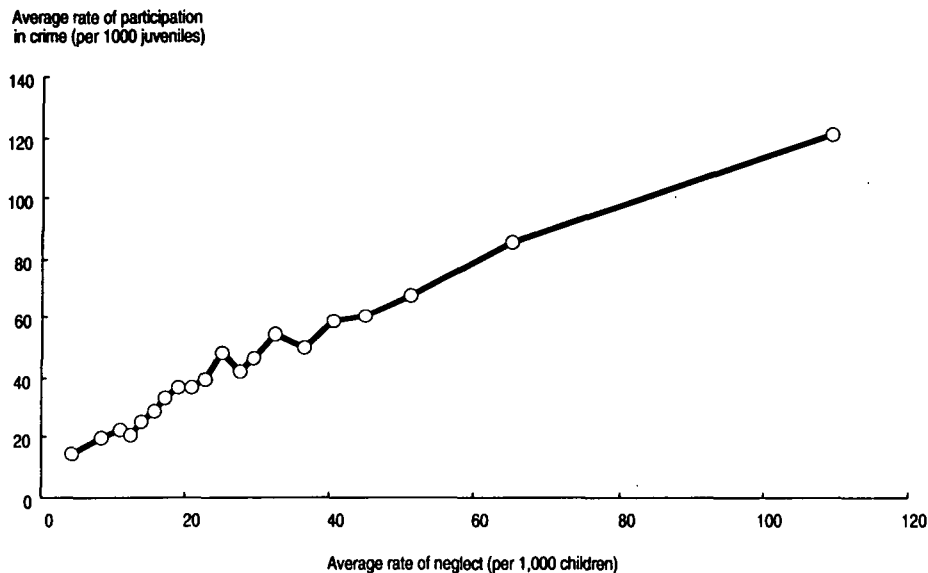


Figure 5: Average rates of juvenile participation in crime in groups of urban postcodes



Neglect as a predictor of juvenile participation in crime

If parental neglect is a causal factor in child delinquency then neglect should be a predictor of juvenile participation in crime. A linear regression model was fitted with neglect as the only predictor of juvenile participation in crime. This model had an R^2 value of 0.57, indicating that neglect alone explains the same amount of variation in juvenile participation in crime as do the measures of social and economic stress. (The details of these two models are presented in Table 6.)

Figure 4 shows the observed rates of juvenile participation in crime plotted against the neglect rates. The curved line in the figure shows the predicted rates of juvenile participation in crime based on the fitted linear regression model with neglect as the only predictor. Note that, although the fitted line is linear in the logit scale, it is not

linear when the transformation is reversed to express the expected values in the original scale. Nevertheless this curved line should not be taken as evidence that the data are not linear in the original scale. (The transformation was made to normalise the data.) In fact the relationship is strongly linear in the original scale which can be seen in Figure 5. For Figure 5, the postcodes were first sorted according to their rates of neglect then grouped into 20 groups, each containing 13 postcodes (except one group which contained 14). The average rates of juvenile participation in crime were then plotted against the average rates of neglect for the 20 groups of postcodes. It is clear from both Figure 4 and Figure 5 that areas with high rates of neglect generally also have high rates of juvenile participation in crime.

Neglect and social and economic stress as joint predictors of juvenile participation in crime

We now turn to determining whether social and economic stress have any effect on juvenile participation in crime once the effects of neglect have been taken into account. Table 6 shows the results of fitting three models to explain the variation in juvenile participation in crime. The models use different combinations of explanatory variables: social and economic stress only (measured by *poverty*, *single parent families* and *crowded dwellings*); neglect only; and neglect together with social and economic stress. (The first of these models has already been presented in Table 4 but is shown again for ease of comparison.)

Table 6 shows that the full model, including both neglect and the measures of social and economic stress as predictors, explains 69 per cent of the variation in juvenile participation in crime, only an additional 12 percentage points more than the percentage of variation explained by the model containing neglect alone. In the absence of neglect, however, the measures of social and economic stress explain 56 per cent of the variation. It is clear then that a substantial amount of the variation explained by social and economic stress is accounted for by neglect.

**Table 6: Juvenile participation in crime, urban areas (261 postcodes)
Models with neglect and socioeconomic measures as predictors**

<i>Terms in the model</i>	<i>Model with social and economic stress only</i>		<i>Model with neglect only</i>		<i>Model with neglect and social and economic stress</i>	
	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>
Intercept	-4.47	0.0001	-3.57	0.0001	-4.29	0.0001
Neglect	-	-	15.86	0.0001	11.65	0.0001
Poverty	2.34	0.0001	-	-	1.70	0.0001
Single parent families	7.64	0.0001	-	-	1.46	0.0960
Crowded dwellings	2.82	0.0001	-	-	2.40	0.0001
<i>R² for fitted model</i>	0.56		0.57		0.69	

Nevertheless the association between juvenile participation in crime and social and economic stress is not *fully* explained by neglect. The increase in R^2 , from the neglect only model to the model with all variables included, is statistically significant ($F_{3, 256} = 32.6$). The additional explanatory power is due only to *poverty* and *crowded dwellings*. In the presence of neglect, the regression coefficient for *single parent families* is not significantly different from zero.

Abuse and social and economic stress as joint predictors of juvenile participation in crime

Table 7 presents information similar to that presented in Table 6 except that abuse replaces neglect as a predictor of juvenile participation in crime. The three models in Table 7 use the following combinations of variables to explain the variation in juvenile participation in crime: social and economic stress only (measured by *poverty*, *single parent families* and *crowded dwellings*); abuse only; and abuse together with social and economic stress.

Table 7: Juvenile participation in crime, urban areas (261 postcodes)
Models with abuse and socioeconomic measures as predictors

<i>Terms in the model</i>	<i>Model with social and economic stress only</i>		<i>Model with abuse only</i>		<i>Model with abuse and social and economic stress</i>	
	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>
Intercept	-4.47	0.0001	-3.67	0.0001	-4.40	0.0001
Abuse	-	-	39.69	0.0001	27.84	0.0001
Poverty	2.34	0.0001	-	-	2.00	0.0001
Single parent families	7.64	0.0001	-	-	1.79	0.0413
Crowded dwellings	2.82	0.0001	-	-	2.32	0.0001
R^2 for fitted model	0.56		0.55		0.68	

Given that neglect and abuse are highly correlated with each other ($r = 0.90$; see Table 2), it is not surprising that the results in Table 7 are very similar to those we obtained for neglect. The model with all predictors included explains 68 per cent of the variation in juvenile participation in crime. When we compare the last two models in the table, we find that adding social and economic stress as predictors to a model which already contains abuse increases the R^2 from 0.55 to 0.68. While abuse accounts for most of the total explained variation, the increase in R^2 is significant ($F_{3, 256} = 36.3$) indicating that the measures of social and economic stress are still significantly associated with juvenile participation in crime after taking account of abuse.

Predictors of juvenile participation in property crime

It is of interest to know whether the results we have found for juvenile participation in crime are the same for participation in both property and violent crime. Tables 8 and 9

**Table 8: Juvenile participation in property crime, urban areas (261 postcodes)
Models with neglect and socioeconomic measures as predictors**

<i>Terms in the model</i>	<i>Model with social and economic stress only</i>		<i>Model with neglect only</i>		<i>Model with neglect and social and economic stress</i>	
	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>
Intercept	-4.68	0.0001	-3.77	0.0001	-4.48	0.0001
Neglect	-	-	15.94	0.0001	11.50	0.0001
Poverty	2.33	0.0001	-	-	1.72	0.0001
Single parent families	7.84	0.0001	-	-	1.62	0.0708
Crowded dwellings	2.77	0.0001	-	-	2.34	0.0001
<i>R</i>² for fitted model	0.58		0.58		0.69	

show the results of fitting regression models for juvenile participation in *property* crime. The models are the same as those fitted for juvenile participation in (property and /or violent) crime. Results for the models where neglect is a predictor are shown in Table 8 and those where abuse is a predictor are shown in Table 9.

**Table 9: Juvenile participation in property crime, urban areas (261 postcodes)
Models with abuse and socioeconomic measures as predictors**

<i>Terms in the model</i>	<i>Model with social and economic stress only</i>		<i>Model with abuse only</i>		<i>Model with abuse and social and economic stress</i>	
	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>
Intercept	-4.68	0.0001	-3.86	0.0001	-4.60	0.0001
Abuse	-	-	39.59	0.0001	26.67	0.0001
Poverty	2.33	0.0001	-	-	2.03	0.0001
Single parent families	7.84	0.0001	-	-	2.13	0.0185
Crowded dwellings	2.77	0.0001	-	-	2.27	0.0001
<i>R</i>² for fitted model	0.58		0.54		0.68	

The results are similar to those shown in Tables 6 and 7. Again neglect accounts for most of the variation in juvenile participation in property crime (Table 8), as does abuse (Table 9). Comparing the last two models in Table 8 (i.e. the model with neglect as the only predictor and the model with all predictor variables included), the increase in R^2 is significant ($F_{3, 256} = 32.0$). The same is true for the models in Table 9 where neglect is replaced by abuse ($F_{3, 256} = 36.2$). In the presence of neglect, *single parent families* ceases to be a significant predictor. However, all three measures of social and economic stress remain significant in the presence of abuse.

Predictors of juvenile participation in violent crime

Tables 10 and 11 show the results of fitting similar regression models for juvenile participation in *violent* crime. Results for the models where neglect is a predictor are shown in Table 10 and those where abuse is a predictor are shown in Table 11.

Table 10: Juvenile participation in violent crime, urban areas (256 postcodes)
Models with neglect and socioeconomic measures as predictors

Terms in the model	Model with social and economic stress only		Model with neglect only		Model with neglect and social and economic stress	
	Parameter estimate	p	Parameter estimate	p	Parameter estimate	p
Intercept	-5.66	0.0001	-4.76	0.0001	-5.48	0.0001
Neglect	-	-	15.73	0.0001	11.92	0.0001
Poverty	2.14	0.0001	-	-	1.55	0.0003
Single parent families	7.76	0.0001	-	-	1.33	0.2397
Crowded dwellings	2.88	0.0001	-	-	2.49	0.0001
R² for fitted model	0.47		0.49		0.58	

It is apparent that the percentage of variation explained in juvenile participation in *violent* crime is substantially less than the percentage of variation explained in juvenile participation in *property* crime. Nevertheless there is a familiar pattern in the results. Again, neglect accounts for most of the variation explained by social and economic stress. When measures of social and economic stress are added to a model, which already includes neglect as a predictor, the percentage of variation explained increases by nine percentage points, from 49 per cent to 58 per cent. In contrast, the measures of social and economic stress explain 47 per cent of the variation in the absence of neglect, indicating that most of the effect of social and economic stress is mediated through neglect.

Nevertheless the results for the model including both neglect and measures of social and economic stress show that, after taking account of neglect, *poverty* and *crowded dwellings* still have a significant effect on juvenile participation in violent crime. The increase in R^2 is statistically significant ($F_{3,251} = 18.5$).

As can be seen in Table 11, the results for models containing abuse instead of neglect as a predictor are almost identical to those in Table 10. We note that in the case of juvenile participation in violent crime, although there is a significant increase in R^2 ($F_{3,251} = 20.9$) from the abuse only model to the abuse plus social and economic stress model, *single parent families* is not a significant predictor in the presence of abuse. This result differs from that in Table 9 where *single parent families* was a significant predictor in the presence of abuse for juvenile participation in property crime.

**Table 11: Juvenile participation in violent crime, urban areas (256 postcodes)
Models with abuse and socioeconomic measures as predictors**

<i>Terms in the model</i>	<i>Model with social and economic stress only</i>		<i>Model with abuse only</i>		<i>Model with abuse and social and economic stress</i>	
	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>
Intercept	-5.66	0.0001	-4.87	0.0001	-5.60	0.0001
Abuse	-	-	39.81	0.0001	28.95	0.0001
Poverty	2.14	0.0001	-	-	1.88	0.0001
Single parent families	7.76	0.0001	-	-	1.58	0.1601
Crowded dwellings	2.88	0.0001	-	-	2.39	0.0001
<i>R</i>² for fitted model	0.47		0.47		0.58	

Neglect and abuse as joint predictors of juvenile participation in crime

Up to this point we have not included neglect and abuse together as predictors in the same regression model for any of our measures of juvenile participation in crime. Because they are highly correlated with each other, we would expect there to be multicollinearity if they were both included as predictor variables in a regression model. This indeed proved to be the case when we attempted to fit such models. For each of our measures of juvenile participation in crime (property and/or violent crime; property crime only; violent crime only) we fitted a regression model with neglect *and* abuse as predictors together with the three measures of social and economic stress. In each case there were variance inflation factors of about 10 or 11 for neglect and abuse, indicating high multicollinearity.¹⁰ For this reason we do not present the results from fitting these models other than to note that, in every case, in the presence of neglect the regression coefficient for abuse was not significantly different from zero.

Path analysis

We now consider a path analysis for our main measure of juvenile participation in crime (either property or violent crime). The path analysis allows us to assess the relative importance of neglect as a cause of juvenile participation in crime. Our regression analyses have shown that, although neglect explains most of the variation in juvenile participation in crime, some measures of social and economic stress remain as significant predictors of juvenile participation in crime after taking account of neglect. Our regression analyses have also shown similar results when neglect is replaced by abuse. In our set of variables for the path analysis we therefore include the measures of social and economic stress as well as neglect and abuse. We posit the following causal relationships:

- *poverty, single parent families and crowded dwellings* are causes of neglect
- *poverty, single parent families and crowded dwellings* are causes of abuse
- *poverty, single parent families, crowded dwellings, neglect and abuse* are causes of juvenile participation in crime.

Following Kang and Seneta (1980) these causal relationships are expressed as three linear predictor functions, one for each of neglect, abuse and juvenile participation in crime. The coefficients in these linear functions (in which all variables are in standardised form) are the path coefficients; they are estimated using least squares.

The path diagram, shown in Figure 6, includes a single-headed arrow for each causal relationship. Hence, for both neglect and abuse, there are arrows leading from each of their three posited causes and, for juvenile participation in crime, there are arrows leading from each of its five posited causes. The estimated path coefficients are shown on each of these single-headed arrows. The path diagram also shows the residuals and single-headed arrows leading from them to the appropriate variables: the associated path coefficients indicate the relative importance of unexplained causes.

Considering the paths from posited causes only, the largest path coefficient is that from neglect to juvenile participation in crime (0.50), indicating that of all the posited causes of juvenile participation in crime, neglect has the greatest causal influence. We note in particular that the path coefficient from abuse to juvenile participation in crime is relatively small (0.10). The path analysis also shows that *poverty* and *single parent families* have a greater causal influence on neglect than does *crowded dwellings*.

Figures 7 and 8 show similar path diagrams for juvenile participation in property crime and juvenile participation in violent crime. The results are similar in that, of the specified causal variables, neglect has the greatest causal influence on both juvenile participation in property crime and juvenile participation in violent crime. It is, however, of interest to compare the relative size of the path coefficients from neglect and abuse in Figures 7 and 8. For juvenile participation in property crime, the path coefficient from neglect is quite large (0.54) whereas the path coefficient from abuse (0.03) is negligible. By contrast, for juvenile participation in violent crime, the path coefficient from neglect is smaller (0.44) and the path coefficient from abuse is larger (0.11).

Figure 6: Path diagram for juvenile participation in crime (urban areas)

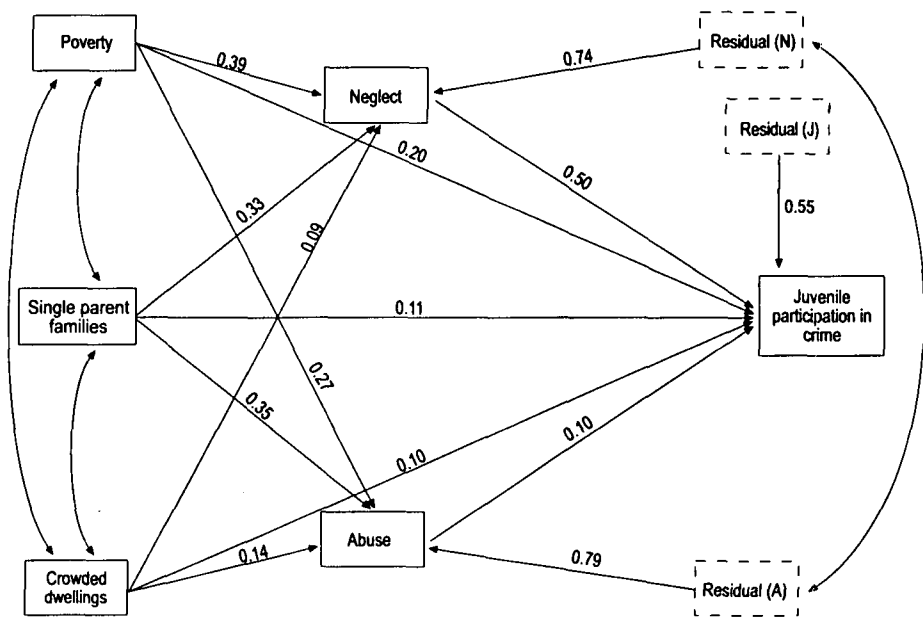


Figure 7: Path diagram for juvenile participation in property crime (urban areas)

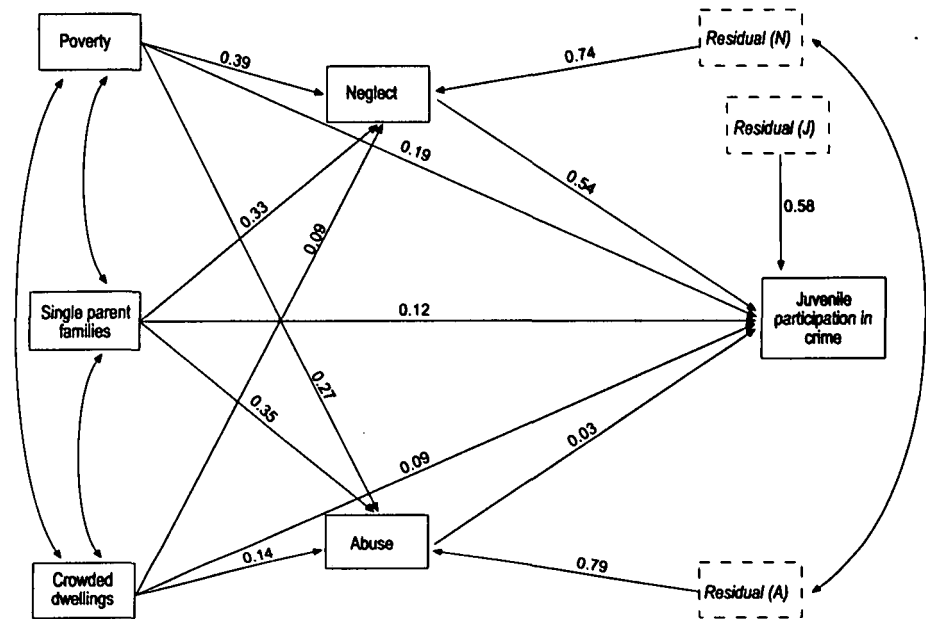
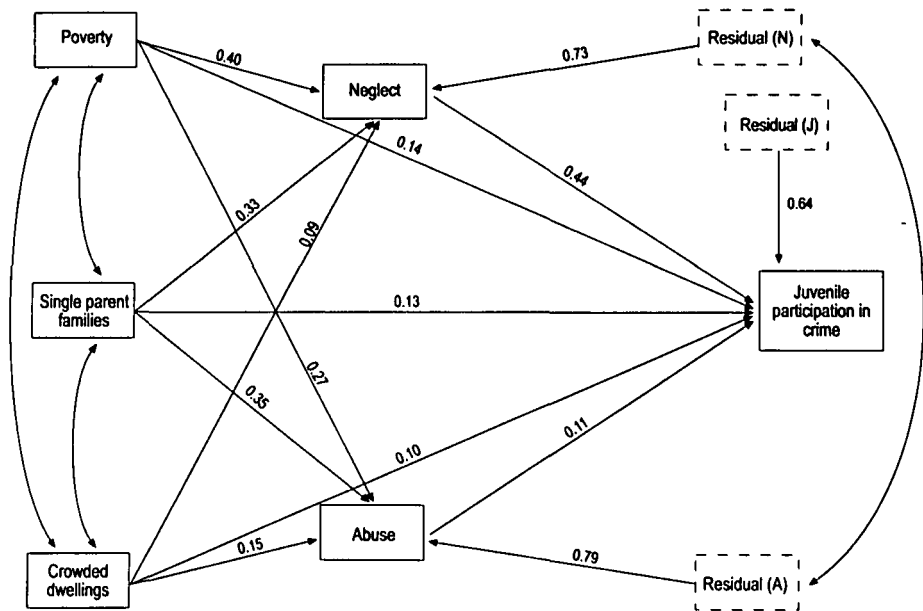


Figure 8: Path diagram for juvenile participation in violent crime (urban areas)



ANALYSIS OF DATA FOR RURAL AREAS

Correlations

For the postcodes in rural areas of NSW, Table 12 shows the matrix of pairwise correlations between all the variables of interest, that is, the measures of neglect, abuse, juvenile participation in crime and of social and economic stress. All of these correlations

are of the variables measured in their original scales of measurement (i.e. not transformed).

In general, the correlations in rural areas are weaker than those in urban areas. This observation is not surprising because, compared with urban areas, there is a more heterogeneous mix of social and demographic characteristics amongst the residents within a rural postcode area.

From Table 12 we see that juvenile participation in crime is significantly positively correlated with some but not all of the measures of social and economic stress. In rural areas, neither *poverty* nor *stability* is significantly correlated with juvenile participation in crime. (Juvenile participation in violent crime is significantly correlated with *stability* but the correlation is negative.)

Neglect and abuse are significantly correlated with each of the measures of social and economic stress. Except for the correlations with *stability*, all the correlations are positive. Hence rates of child neglect and child abuse tend to be higher in areas with higher rates of *poverty*, *unemployment*, *single parent families* and *crowded dwellings*.

As was the case in urban areas, all measures of juvenile participation in crime are positively correlated with both neglect and abuse, indicating that rates of juvenile participation in crime are generally higher in areas with higher rates of neglect and abuse.

Social and economic stress as predictors of neglect, abuse and juvenile participation in crime

As with the urban data analysis, we begin by fitting regression models to determine which combination of the measures of social and economic stress best explain juvenile participation in crime. In rural areas the analysis for juvenile participation in crime was based on the 235 postcodes for which there were non-zero rates of all three of the variables, juvenile participation in crime, neglect and abuse. Table 13 shows the results of fitting two multiple linear regression models: the first (Model 1) includes all the socioeconomic measures as predictors of juvenile participation in crime; the second (Model 2) includes only *single parent families* and *crowded dwellings* as predictors. (As noted earlier, the response variable in the regression models was transformed using the logistic transformation and the parameters were estimated using weighted least squares.)

Table 13 shows that in Model 1 the regression coefficients for *poverty*, *unemployment* and *stability* are not significantly different from zero. Model 2 excludes all three of these variables. As there is negligible difference in the R^2 values between the two models (0.244 for Model 1 compared with 0.236 for Model 2), it is clear that Model 2 explains the same amount of variation in juvenile participation in crime as does Model 1. We can therefore conclude that in the presence of the social stress measures (*single parent families* and *crowded dwellings*), neither of the economic stress measures (*poverty* and *unemployment*) is a necessary explanatory variable for juvenile participation in crime in rural areas. It is also apparent that, compared with urban areas, a much smaller proportion of the variation in juvenile participation in crime is explained by the socioeconomic predictor variables. The results from fitting Model 2 show that only 24 per cent of the variation in the rates of juvenile participation in crime across rural postcodes is explained by the levels of *single parent families* and *crowded dwellings* in those postcodes.

Table 12: Pearson correlation coefficients for rural postcodes

	<i>Neglect</i>	<i>Abuse</i>	<i>Juvenile participation in crime</i>	<i>Juvenile participation in property crime</i>	<i>Juvenile participation in violent crime</i>	<i>Poverty</i>	<i>Unemployment</i>	<i>Single parent families</i>	<i>Stability</i>	<i>Crowded dwellings</i>
Neglect	1.00									
Abuse	0.79	1.00								
Juvenile participation in crime	0.53	0.47	1.00							
Juvenile participation in property crime	0.53	0.48	0.99	1.00						
Juvenile participation in violent crime	0.50	0.47	0.94	0.89	1.00					
Poverty	0.16	0.24	NS	NS	NS	1.00				
Unemployment	0.25	0.32	0.28	0.28	0.22	0.63	1.00			
Single parent families	0.37	0.33	0.33	0.33	0.20	0.18	0.52	1.00		
Stability	-0.18	-0.17	NS	NS	-0.19	NS	0.30	0.32	1.00	
Crowded dwellings	0.23	0.19	0.43	0.41	0.44	NS	0.32	0.18	-0.29	1.00

Note: 'NS' indicates that the correlation was not significantly different from zero ($p \leq 0.05$).

Table 13: Juvenile participation in crime, rural areas (235 postcodes)
Models with socioeconomic measures as predictors

<i>Terms in the model</i>	<i>Model 1</i>		<i>Model 2</i>	
	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>
Intercept	-4.55	0.0001	-4.42	0.0001
Poverty	1.33	0.1838	-	-
Unemployment	-1.05	0.4594	-	-
Single parent families	6.99	0.0005	6.19	0.0003
Stability	-0.39	0.5651	-	-
Crowded dwellings	7.56	0.0001	7.58	0.0001
<i>R² for fitted model</i>	0.24		0.24	

The small R^2 values for these fitted regression models in rural areas probably result from the fact that a rural postcode area is generally larger (in area, not necessarily in population) and less homogeneous than its urban counterpart. Within one rural postcode there could be considerable variation in our variables of interest. Ideally it would be preferable to test our hypotheses using data for smaller areas (e.g. census collection district areas instead of postcodes).

If *single parent families* and *crowded dwellings* influence juvenile participation in crime because they are causal factors for child neglect and abuse, then we would expect these variables to be good predictors of child neglect and abuse. Table 14 presents the results of fitting linear regression models using these variables as predictors of neglect and abuse.

Table 14: Neglect and abuse, rural areas (235 postcodes)
Models with social stress measures as predictors

<i>Terms in the model</i>	<i>Neglect</i>		<i>Abuse</i>	
	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>
Intercept	-3.83	0.0001	-4.69	0.0001
Single parent families	6.46	0.0001	5.36	0.0001
Crowded dwellings	1.71	0.1426	2.35	0.0199
<i>R² for fitted model</i>	0.08		0.09	

Table 14 shows that *single parent families* and *crowded dwellings* explain only a very small proportion of the variation in neglect and abuse. For neglect, the regression coefficient for *crowded dwellings* is not significant.

Neglect as a predictor of juvenile participation in crime

The next step in our analysis is to determine how well neglect predicts juvenile participation in crime and whether the measures of social stress are significant predictors of juvenile participation in crime once the effects of neglect are taken into account.

**Table 15: Juvenile participation in crime, rural areas (235 postcodes)
Models with neglect and socioeconomic measures as predictors**

<i>Terms in the model</i>	<i>Model with social stress measures only</i>		<i>Model with neglect only</i>		<i>Model with neglect and social stress measures</i>	
	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>
Intercept	-4.42	0.0001	-3.20	0.0001	-4.41	0.0001
Neglect	-	-	9.57	0.0001	7.89	0.0001
Single parent families	6.19	0.0003	-	-	3.03	0.0604
Crowded dwellings	7.58	0.0001	-	-	6.74	0.0001
<i>R</i>² for fitted model	0.24		0.22		0.37	

Table 15 presents the results from fitting three regression models to explain juvenile participation in crime. The three models include different combinations of predictor variables: (1) the social stress measures only (*single parent families* and *crowded dwellings*); (2) neglect only; and (3) neglect and the social stress measures. (We showed the first of these models in Table 13 but include it again in Table 15 for ease of comparison.)

The proportion of variation in juvenile participation in crime explained by neglect alone is about the same as the proportion explained by the social stress measures alone (22 per cent compared with 24 per cent). When neglect is included as a predictor together with the social stress measures, the R^2 increases to 37 per cent. While neglect accounts for most of the explained variation in this model, the increase in R^2 is significant ($F_{2, 231} = 27.5$). In the presence of neglect *crowded dwellings* remains a significant predictor of juvenile participation in crime. This result is not surprising given that we found that *crowded dwellings* was not a significant predictor of neglect in rural areas. However, *single parent families* is not a significant predictor of juvenile participation in crime in the presence of neglect. Although the R^2 values are much smaller, the general pattern of these results is similar to that found in urban areas.

Abuse as a predictor of juvenile participation in crime

Table 16 presents the results from fitting three regression models similar to those just shown in Table 15 but with abuse replacing neglect in the regression models. The results are the same as those for neglect. Comparing the model containing abuse as the only predictor with the model containing abuse and the two social stress measures as predictors, the R^2 increases from 0.22 to 0.36, indicating that abuse accounts for most of the explained variation in juvenile participation in crime in rural areas (although the total proportion of variation explained is quite low). The increase in R^2 is nevertheless significant ($F_{2, 231} = 24.5$). In the presence of abuse *crowded dwellings* remains a significant predictor of juvenile participation in crime but *single parent families* does not.

Models for other measures of juvenile participation in crime

Similar regression models were fitted for the following measures as response variables:

- juvenile participation in property crime;
- juvenile participation in violent crime.

Table 16: Juvenile participation in crime, rural areas (235 postcodes)
Models with abuse and socioeconomic measures as predictors

<i>Terms in the model</i>	<i>Model with social stress measures only</i>		<i>Model with abuse only</i>		<i>Model with abuse and social stress measures</i>	
	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>	<i>Parameter estimate</i>	<i>p</i>
Intercept	-4.42	0.0001	-3.27	0.0001	-4.41	0.0001
Abuse	-	-	25.71	0.0001	20.24	0.0001
Single parent families	6.19	0.0003	-	-	3.17	0.0525
Crowded dwellings	7.58	0.0001	-	-	6.48	0.0001
<i>R² for fitted model</i>	0.24		0.22		0.36	

Rather than present the full details of all of these models, especially as the results are similar to those we have already seen, we present a summary only. Table 17 shows the *R²* values for all the models for fitted for these variables. The models for juvenile participation in property crime use data from 235 postcodes; those for juvenile participation in violent crime use data from 217 postcodes.

There are a number of features of the results in Table 17 worth noting. As we found with the regression models for our main measure of juvenile participation in crime, none of the models explains a large proportion of the variation in the response variable. However, the social stress variables, *single parent families* and *crowded dwellings*, explain a greater proportion of the variation in juvenile participation in violent crime than they do of the variation in juvenile participation in property crime. Indeed, for juvenile participation in violent crime, neglect accounts for only about half of the total variation explained by the model including all three predictor variables (neglect, *single parent families* and *crowded dwellings*). The same is true for the models with abuse replacing neglect.

Table 17: *R²* values for fitted models for juvenile participation in property and violent crime

<i>Predictor variables included in model*</i>	<i>Response variable</i>	
	<i>Juvenile participation in property crime (R²)</i>	<i>Juvenile participation in violent crime (R²)</i>
S and C	0.22	0.35
N only	0.21	0.22
N, S and C	0.35	0.46
A only	0.22	0.21
A, S and C	0.34	0.44

* S = single parent families; C = crowded dwellings; N = neglect; A = abuse

In the presence of neglect *single parent families* was not a significant predictor for juvenile participation in violent crime. This was also the case in the presence of abuse.

Path analysis

Following the same procedure as we did for urban areas we posit the following causal relationships in rural areas:

- *single parent families* and *crowded dwellings* are causes of neglect
- *single parent families* and *crowded dwellings* are causes of abuse
- *single parent families*, *crowded dwellings*, neglect and abuse are causes of juvenile participation in crime.

The path diagram is shown in Figure 9. It includes a single-headed arrow for each causal relationship; hence there are two arrows leading to each of neglect and abuse (one from each of their posited causes) and four leading to juvenile participation in crime. The estimated path coefficients are shown on each of these single-headed arrows.

We note first of all that the path coefficients from the residuals are the largest in the path diagram indicating that, for all endogenous variables, the unspecified causes have greater influence than the posited causes.

Single parent families has a greater causal influence on both neglect and abuse than *crowded dwellings*. This finding agrees with the results from the urban path analysis, as does the finding that abuse has less causal influence on juvenile participation in crime than neglect (the path coefficient from neglect to juvenile participation in crime is 0.34 compared with 0.11 for the path from abuse).

However, in contrast to the urban path analysis, neglect and *crowded dwellings* have approximately equal causal influence on juvenile participation in crime. The path coefficient for neglect as a cause of juvenile participation in crime is 0.34 whereas the path coefficient for *crowded dwellings* as a cause is 0.35.

Figures 10 and 11 show the rural path diagrams for juvenile participation in property and violent crime, respectively. The path coefficients for property crime are quite similar to those in Figure 9 (for participation in property and/or violent crime). However, it is notable that in Figure 11, the path coefficient for *crowded dwellings* as a cause of juvenile participation in violent crime is substantially larger than that for neglect as a cause. For both property and violent crime, neglect remains more important than abuse, as a cause of juvenile participation in crime.

Figure 9: Path diagram for juvenile participation in crime (rural areas)

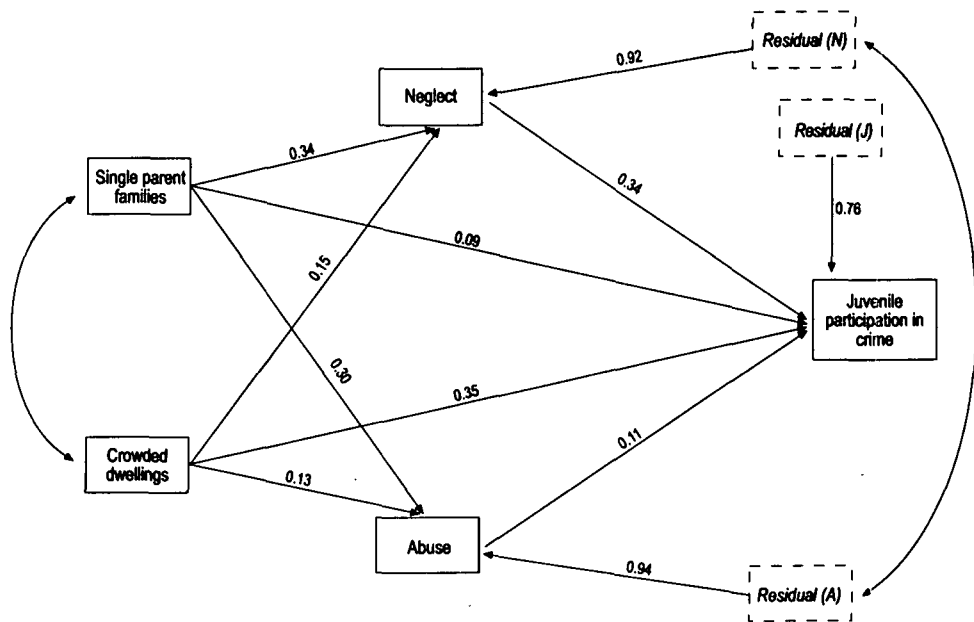


Figure 10: Path diagram for juvenile participation in property crime (rural areas)

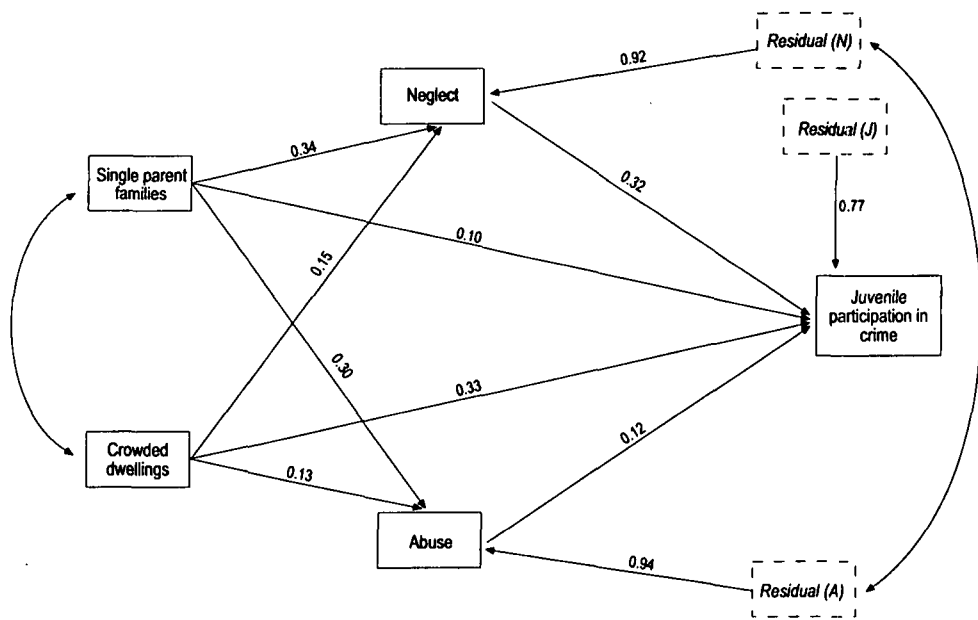
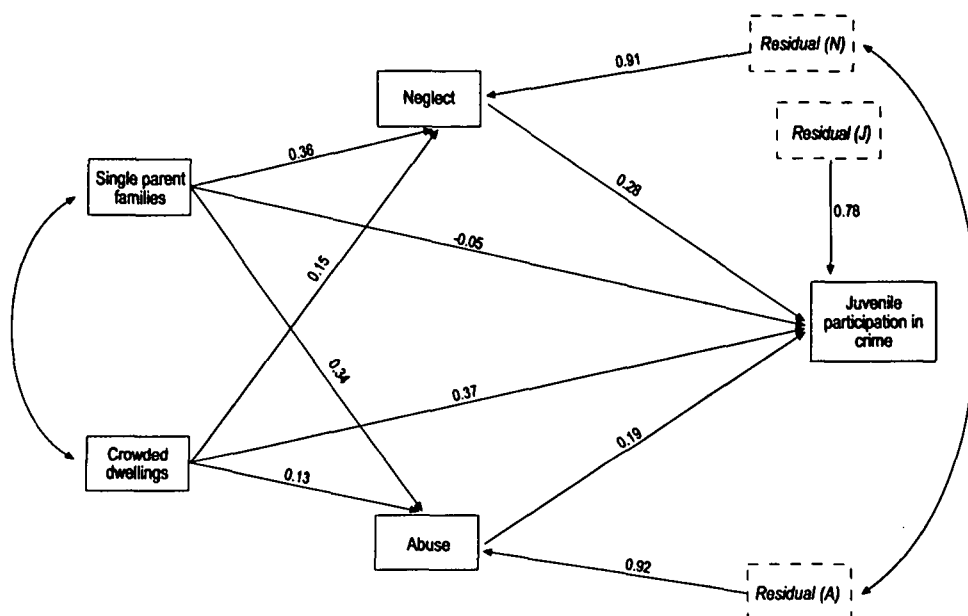


Figure 11: Path diagram for juvenile participation in violent crime (rural areas)



SUMMARY AND DISCUSSION

The aim of this research was to test four hypotheses pertinent to an assessment of how social and economic stress exert their influence on aggregate crime rates. The four hypotheses were:

- (1) There is a positive relationship between the level of social and economic stress in an area and its level of juvenile participation in crime.
- (2) There is a positive relationship between the level of social and economic stress in an area and its rates of child neglect and abuse.
- (3) The effects of social and economic stress on juvenile participation in crime are mediated mostly through the effects of social and economic stress on rates of child neglect and abuse.
- (4) The relationship posited in (3) holds up for participation in both property and violent offences.

These four hypotheses were tested first for urban then for rural areas so we will discuss them in the same order.

By and large, the four hypotheses are all strongly supported by the urban analyses. To begin with, there were strong positive pairwise correlations between child neglect, child abuse, juvenile participation in crime and *poverty* (see Table 2). These correlations were just as strong, if not stronger, when they were computed across the bottom 10 per cent of postcodes in terms of *poverty*. This last observation is difficult to explain in terms of the so-called surveillance hypothesis, that is, the thesis that the association between economic stress, child maltreatment and juvenile involvement in crime arises simply from the fact that poor households are subjected to greater official surveillance than non-poor households.

Our first hypothesis is confirmed by the results of fitting the multiple linear regressions shown in Table 4. *Poverty*, *single parent families* and *crowded dwellings* are all shown to be significant predictors of juvenile participation in crime. The positive regression coefficients indicate that postcodes with high levels of these social and economic stressors, generally have high levels of juvenile participation in crime.

The results in Table 5 show that these same measures of social and economic stress are also significant predictors of neglect and abuse, again with positive regression coefficients, confirming our second hypothesis.

Tables 6 and 7 provide the evidence for the third hypothesis. Table 6 shows firstly that reported rates of reported neglect account for 57 per cent of the variation in rates of juvenile participation in crime across urban postcodes. In fact, on its own, neglect accounts for as much of the variation in juvenile participation in crime as *poverty*, *single parent families* and *crowded dwellings* combined. Secondly, Table 6 shows that, when neglect and social and economic stress measures are all included as predictors, they explain 69 per cent of the variation in juvenile participation in crime. Comparing this result with that for the model with neglect as the only predictor, it is clear that most of the explained variation is accounted for by neglect. We can therefore conclude that the effects of social and economic stress on juvenile participation in crime are mostly

mediated through the effects of these measures on neglect. Table 7 shows similar findings for abuse.

Tables 8 and 9 reveal that this general pattern holds up if, instead of examining juvenile participation in crime in general (i.e. participation in property and/or violent crime), we restrict our focus to juvenile participation in *property* crime. However, the relationships are not quite as strong when we examine the interrelationship between social and economic stress, child neglect and abuse, and juvenile participation in *violent* crime. Tables 10 and 11 show that neither neglect (Table 10) nor abuse (Table 11), either alone or in company with our measures of social and economic stress, explains as much of the variation in violent crime as each explains (whether singly or in concert) of the variation in property crime. On the whole, however, the pattern of findings obtained when juvenile participation in property and violent crime are considered separately is consonant with that obtained for general participation in crime. These findings confirm our fourth hypothesis.

The path analysis provides confirmation of the findings from the regression analyses but, more importantly, shows that neglect is more influential than abuse as a pathway between social and economic stress and juvenile participation in crime. This is an interesting finding. It appears to indicate that the significant results obtained from fitting regression models with abuse as a predictor may be due to the high correlation between abuse and neglect (i.e. that abuse was a proxy measure of neglect in these regressions). When neglect and abuse are both present, as in the path analysis, it is neglect which is the important factor. This result mirrors the common finding among individual-level studies that, while neglect and abuse are often found together, measures tapping the level of parental supervision or the strength of the parent-child bond are better predictors of juvenile involvement in crime than variables tapping the level of family conflict or the harshness of parental discipline (Loeber & Stouthamer-Loeber 1986).

The symmetry between the results of individual-level studies on the correlates of delinquency and the present aggregate-level study is also exhibited to some extent in another feature of the path analysis. As we noted earlier, although neglect is more important than abuse as a pathway to juvenile involvement in crime, in the shift from the predictors of participation in property crime to the predictors of participation in violent crime, the relative importance of neglect declines while the relative importance of abuse increases (although the path coefficient for neglect is still four times as large as that for abuse). In her prospective longitudinal study of neglected and abuse children McCord (1979, 1980) also found that aggressive offenders were more likely to have had parents whose behaviour was abusive than non-aggressive offenders.

Overall, the results from the urban analysis provide strong support for our four hypotheses, except that the importance of child abuse appears to result mainly from its high correlation with child neglect. We can, in fact, use the results from the path analysis, together with population data for the urban postcodes, to determine the impact on juvenile participation in crime of an increase in reported neglect or an increase in poverty. Assuming the level of reported child abuse and the levels of poverty, single parent families and crowded dwellings all remain constant, an increase of 1,000 additional neglected children would result in an additional 256 juveniles involved in crime. Similarly, assuming the levels of poverty, single parent families and crowded dwellings remain constant, an increase of 1,000 additional families with incomes less than \$16,000 per annum would result in an additional 141 juveniles involved in crime.¹¹

We can take this a step further to determine a lower bound for the additional amount of crime which would result from these increases in neglect or poverty. Coumarelos (1994) estimated that during a (juvenile) criminal career each juvenile offender has 1.82 court appearances. An additional 1,000 neglected children would therefore result in an additional 466 Children's Court appearances and an additional 1,000 poor families would result in an additional 257 Children's Court appearances. As only a small proportion of crimes committed result in a court appearance, the additional number of criminal offences committed is likely to be substantially greater than these estimates.

There are clearly a number of differences between the results of our analysis of rural areas and the results of our urban analyses. The most notable are (a) the lower correlations between all pairs of relevant variables; (b) the fact that, in the presence of *single parent families* and *crowded dwellings*, neither of the economic stress measures (i.e. *poverty* and *unemployment*) is significantly associated with juvenile participation in crime; (c) the fact that, of the two measures of social stress, only *single parent families* is a significant predictor of neglect whereas both *single parent families* and *crowded dwelling* are significant predictors of abuse; (d) the fact that *single parent families* and *crowded dwellings* explain only a small proportion of the variation in rates of neglect and abuse; and (e) the fact that a much smaller proportion of the variation in juvenile participation in crime is able to be explained in rural areas than in urban areas. These differences are counterbalanced by some similarities. Neglect (on its own) also explains as much of the variation in juvenile participation in crime as do our measures of social stress. Also, child neglect remains the most salient predictor of juvenile involvement in crime when included in a regression analysis along with *single parent families* and *crowded dwellings*.

The path analysis for rural areas again shows that neglect is more important than abuse as a predictor of juvenile participation in crime. It also shows that *crowded dwellings* is as important a predictor as neglect.

The results from the rural analyses may be interpreted in two ways. We can interpret the rural results at face value and conclude that the strong relationships found in urban areas do not hold up in rural areas. Alternatively we can conclude that our capacity to find strong relationships in rural areas is reduced because our measures of the variables of interest are much poorer in rural areas than they are in urban areas. There are several reasons for preferring the latter interpretation to the former.

Firstly, it is likely that the threshold for reporting child neglect is higher in postcodes where problems such as poor parental supervision and parental rejection of children are endemic and familiar, and/or where there is a tradition of hostility between residents and child welfare authorities. This is quite likely to be the case in Aboriginal communities. The history of encounters between Aboriginal people and child welfare authorities has understandably left a legacy of anger, fear and distrust on the part of Aboriginal people toward such authorities (Human Rights and Equal Opportunity Commission 1997). Given this fact and the marked variation across rural areas in the numbers of Aboriginal residents, there is strong reason to believe that at least some of the variation in recorded rates of child neglect in rural areas reflects nothing more than variation in the willingness of people to report child neglect. In such circumstances, the recorded rate of child neglect will be an imperfect measure of the level of parental control over or attachment to children. The resulting poor measure of neglect is likely to have weaker correlations with measures both of social and economic stress, and of juvenile participation in crime.

The importance of *crowded dwellings* in the regression analysis and in the path analysis can perhaps be taken as further evidence that reported neglect in rural areas is a poor measure of parental control over or attachment to children. Zuravin (1986) notes that 'the many examinations of the relationship between overcrowding and parental supervision have repeatedly shown that parents living in crowded households have less knowledge about and less control over their children's whereabouts and outside activities than parents living in less crowded conditions, even after controlling for major confounding variables like ethnicity and class'. In the rural analysis we found that in the presence of *single parent families*, *crowded dwellings* was not a significant predictor of reported neglect yet it was an important predictor of juvenile participation in crime. It seems plausible then that, in rural areas, *crowded dwellings* is a proxy measure for unreported neglect.

Another factor affecting the rural analysis is that rural postcode areas may simply be too large a unit of spatial aggregation to tease out the separate effects of social and economic stress on crime. In rural areas many postcodes are large enough to encompass both the wealthiest and poorest parts of a town. Furthermore, the vagaries of weather and demand for rural products almost certainly produce marked variations from year to year in household income. As a result, actual household income levels during the period over which juvenile criminal participation rate data were collected might have departed considerably from their values at the time of the 1991 census. The absence of any effect of unemployment or poverty on criminal participation rates in rural areas when controls have been introduced for social stress should not therefore be taken as indicating that economic stress is irrelevant to an understanding of crime in rural areas.

Finally, although this is not the place for a full discussion of the policy issues arising from the current study, our discussion would not be complete without a few comments on these issues. They fall naturally into two categories: those concerned with the structural conditions which foster child neglect, and those concerned with the scope for preventing child neglect through early childhood intervention programs. We will deal with each of these in turn.

Perhaps the most obvious implication of the present results is that policies designed to reduce poverty can be expected to reduce crime. Such a conclusion, of course, is hardly novel. Studies observing a statistical association between poverty and crime date back over a century (Quetelet 1831; Guerry 1833). Theories emphasising the importance of poverty as a motivator of offending have a long pedigree (Cloward & Ohlin 1960; Merton 1968; Becker 1968). Governments have also long acknowledged (if not always acted on the understanding) that reductions in poverty and unemployment can be expected to reduce crime. The question therefore arises as to whether the present study departs in any significant way in its implications concerning crime from conclusions reached in other studies examining the relationship between poverty and crime.

Before answering this question one should recall that conventional sociological and economic studies of the relationship between poverty (or unemployment) and crime have almost without exception proceeded on the implicit assumption that poverty (and unemployment) increase crime because they increase the motivation to offend. Since most crimes are committed by young unmarried men, and unemployment is a major source of poverty, the traditional focus among those recommending reductions in structural inequality as a way of bringing down crime rates has been either on global

efforts to reduce poverty (such as the 1960s 'War on Poverty' in the United States) or upon policies designed to increase employment prospects for young males. In either case, because poverty and unemployment are typically assumed to increase the motivation to offend, it has also usually been assumed that programs which reduce poverty and unemployment will produce immediate crime-reduction benefits.

As we saw earlier, it is a matter of record that changes in income and unemployment do not always produce immediate effects on rates of offending (Chiricos 1987; Belknap 1989; Box 1987). The present results suggest that one reason for this may be the fact that the effects of economic stress on crime are more insidious than conventional theories have assumed. Transient periods of economic stress do not generally cause large numbers of otherwise law-abiding people to become involved in crime. The criminogenic effects of a growth in the number of families exposed to chronic economic stress appear to be powerful but indirect. The only visible effect of this process in the short term is likely to be a growth in rates of child neglect and abuse. It is only when the children affected by these conditions reach their crime-prone years that the rate of initiation into crime begins to increase and with it the aggregate rate of offending.

Two implications follow from this state of affairs. Firstly, in the longer term, programs designed to reduce the incidence of poverty among families whose children are at particular risk of neglect (e.g. single parent families and/or families resident in crowded households) should prove more efficacious in reducing juvenile participation in crime than programs designed to reduce unemployment rates among single unmarried men. Secondly, because chronic economic stress appears to exert more pronounced adverse effects on child-rearing practices than transient episodes of economic stress (Lempers, Clark-Lempers & Simons 1989; Harris & Marmer 1996) programs which reduce the sources of chronic economic stress facing families (e.g. long-term unemployment¹²) should prove more beneficial than programs which increase employment rates among those not usually unemployed for long periods or which provide only temporary respite from the effects of economic stress.

This raises the question of what role social welfare policy might have in preventing or controlling crime. Given the evidence we have presented, it might seem safe to conclude that policies which reduce the social security benefits available to families with dependent children living in poverty would reduce juvenile participation in crime. Without rejecting this conclusion outright, it should nonetheless be treated with some caution. The effect of economic stress on parental behaviour may stem as much from the sense of social isolation and stigma engendered by poverty and unemployment as from the material privations these conditions impose on families. If this is true and if dependence on government welfare fails to reduce this sense of stigma and isolation, a more generous social security system, by itself, may not be the optimal means of reducing the incidence of child neglect and thereby reducing the consequent rate of juvenile participation in crime.

It is also worth observing that government policies which ease the financial burdens and stress associated with unemployment can unintentionally succeed in creating employment disincentives. Indeed, according to the so-called 'culture of poverty' thesis (Murray 1984), once poverty comes into existence, it tends to perpetuate itself from generation to generation because children born into poverty never obtain the skills required to secure steady employment. Proponents of this point of view further argue that over-generous social security systems accelerate the rate of family dissolution by

making it financially easier for couples with dependent children to separate. Thus, if the 'culture of poverty' thesis is accepted, far from reducing the criminogenic effects of poverty, government welfare policies may actually succeed in exacerbating them. The way to deal with poverty, on this account, is simply to stimulate economic growth while reducing disincentives to work.

While it is clearly important for governments to avoid creating social security systems which discourage individuals from seeking employment, there is ample reason for doubting the claim that governments should limit their role to one of promoting economic growth while minimising disincentives to employment. Despite its popularity in some circles, the 'culture of poverty' thesis has been the subject of some trenchant scholarly criticism (see, for example, Wilson 1987). Furthermore, just as there are risks associated with policies which create disincentives to employment, there are also risks associated with policies which force parents without adequate social supports back into employment. Economic growth, finally, cannot be relied upon to reduce unemployment when its causes are structural (i.e. when unemployment stems from the fact that those without jobs lack the skills to obtain the jobs which are available).

This last point is particularly pertinent in Australia. One apparent effect of structural changes in the Australian economy over the last two decades appears to have been a progressive concentration of the unemployed and low-income earners in areas where housing is cheap (Gregory & Hunter 1995). Thus those who are at risk of child neglect are increasingly being concentrated in areas which already contain higher than usual levels of participation in crime. Since association with delinquent peers itself stimulates involvement in crime (Elliott, Huizinga & Ageton 1985; Simons & Robertson 1989; Agnew 1991; Warr 1993), one effect of such concentration may be to magnify the effects of economic stress on the rate of initiation to crime. As it happens, recorded rates of offending in most categories increased markedly in Australia over the period 1973-74 to 1988-89 (Mukherjee & Dagger 1990).

On balance, then, governments concerned to reduce the conditions which foster crime-prone communities would be unwise to rely solely on policies designed to stimulate economic growth and reduce disincentives to work. The long-term goal of macroeconomic and macrosocial policy, so far as crime prevention is concerned, should be to reduce the economic and social conditions which foster child neglect. While it is impossible, given the current state of knowledge, to be certain of the services and programs which are likely to prove most cost-effective in achieving this aim there are many worthy of serious consideration. Apart from the basic need to ensure an adequate social security system, the list includes labour market programs designed to provide employment opportunities for the long-term unemployed; access to adequate and affordable housing, transport, health and child-care services; and non-stigmatising parent support services, such as home visiting schemes.

There are programs directed at children and their families which reduce the risk of juvenile involvement in crime (Tremblay & Craig 1995). Such programs compare favourably, in terms of cost effectiveness, with more aggressive use of penal sanctions (Greenwood et al. 1996). There is general consensus among scholars, however, that such programs are only effective if they are introduced well before the onset of involvement in crime (Sherman 1997). This suggests that Australian State and Territory Governments may need to rethink the way they approach the task of juvenile crime prevention. The conventional approach is to treat it as an adjunct to juvenile justice

policy and target prevention programs at juveniles who have already demonstrated their involvement in crime. Both the present study and other similar studies suggest that agencies responsible for the health, education and welfare of children may actually be much better placed to deliver programs designed to prevent juvenile involvement in crime than those who are gatekeepers to the criminal justice system.

NOTES

- 1 According to Loeber and Stouthamer-Loeber the *neglect paradigm* encompasses studies examining the effects of parenting patterns where 'parents spend insufficient time positively interacting with their children', the *conflict paradigm* encompasses studies which examine family patterns 'in which parents and children become enmeshed in escalations of conflict', the *deviant behaviours and attitudes paradigm* encompasses studies which examine either genetic transmission of criminality or the effect of deviant parental behaviour on children and the *disruption paradigm* encompasses studies examining the effects of parental separation or family breakdown.
- 2 Loeber and Stouthamer-Loeber define a normal sample as one in which the sample was 'not selected on the basis of the absence or presence of delinquency or conduct problems but that constrain a cross-section of children on either dimension'.
- 3 The statistic d is calculated as the standardised difference between two group means (i.e. the difference between two group means divided by the pooled within-group variation).
- 4 Dwellings with more than 1.5 persons per bedroom were the sum of: one-bedroom dwellings with two or more residents; two-bedroom dwellings with three or more residents; three-bedroom dwellings with five or more residents; and four-bedroom dwellings with six or more residents.
- 5 These age group populations are used as denominators in the rate calculations. A rate based on a denominator less than 100 was considered to be unreliable, in that a very small change in the numerator could result in quite a large change in the rate.
- 6 A statistical area defined by the ABS. It covers the whole of the greater metropolitan area of Sydney extending as far as Gosford and Wyong to the north, the Blue Mountains to the west and Camden to the south.
- 7 In the weighted least squares method of estimation, the deviation between the observed and expected values of the response variable, y_i , is multiplied by a weight chosen to be inversely proportional to the variance of y_i .
- 8 Multicollinearity occurs when two or more of the predictor variables in a regression model are highly correlated with each other. Multicollinearity has the effect of increasing the variance of estimated regression coefficients making their estimated values less reliable. Variance inflation factors measure the extent to which the variance of regression coefficients is inflated. As a rule of thumb a variance inflation factor greater than five is an indication of a possible problem with multicollinearity.
- 9 The justification for this approach can be argued as follows. The measures for neglect, abuse and juvenile participation in crime, being based on official statistics, are known to underestimate the actual levels of neglect, abuse and juvenile participation in crime. We nevertheless consider the reported rates to be indicators of the actual levels. A non-zero reported rate of neglect therefore provides some information about the actual rate of neglect. However, there is less information about the actual rate when the reported rate is zero. Suppose, for example, that the reported rate of neglect always underestimates the actual rate by 5 percentage points. For a reported rate of neglect of 4 per cent we could then infer that the actual rate was 9 per cent. However, because negative reported rates are impossible, a reported rate of zero could indicate an actual rate anywhere between zero and 5 per cent. Similarly, we could infer that two postcodes with equal *non-zero* reported rates of neglect have the same actual rates of neglect, but we could not make this inference if they both had zero reported rates of neglect.
- 10 See Note 8 for an explanation of variance inflation factors and multicollinearity.
- 11 In the area covered by the urban postcodes there were 1,284,749 families, 851,786 children aged 0-15 and 432,973 juveniles aged 10-17 at the 1991 census. The path coefficients indicate that, with other variables held constant, (1) a unit increase in *neglect* results in a 0.50 unit increase in juvenile participation in crime, and (2) a unit increase in *poverty* results in a 0.42 unit increase in juvenile participation in crime (0.20 directly plus $0.39 \times 0.50 + 0.27 \times 0.10$ indirectly via neglect and abuse). Hence 1,000 additional children reported for neglect would be equivalent to a 1.17 ($=1,000 / 851.786$) unit increase in the neglect rate per thousand children, which would result

in a $0.59 (=1.17 \times 0.50)$ unit increase in the rate of juvenile participation in crime or an additional 256 $(=0.59 \times 432.973)$ juveniles appearing before the Children's Courts. The impact of an increase in the number of poor families is calculated similarly.

- 12 The reference here to the potential long-term effectiveness of employment programs in reducing crime might seem inappropriate given that the present study found no effect of unemployment on juvenile crime participation rates, once the effects of family poverty on crime had been controlled. It should be remembered, however, that the methods employed in the present study only permitted an examination of the concurrent effects of economic variables. Unemployment may not exert strong concurrent effects on juvenile involvement in crime but, as a contributing cause of family poverty it is likely to exert strong delayed effects.

REFERENCES

- Agnew, R. 1991, 'The interactive effects of peer variables on delinquency', *Criminology*, vol. 29, no. 1, pp. 47-71.
- Australian Bureau of Statistics 1993, *Community Profile*, 1991 Census, Cat. no. 2722.0, ABS, Canberra.
- Barnes, G. M. & Farrell, M. P. 1992, 'Parental support and control as predictors of adolescent drinking, delinquency, and related problem behaviors', *Journal of Marriage and the Family*, vol. 54, pp. 763-776.
- Baumrind, D. 1994, 'The social context of child maltreatment', *Family Relations*, vol. 45, pp. 360-368.
- Becker, G. S. 1968, 'Crime and punishment: An economic approach', *Journal of Political Economy*, vol. 76, pp. 169-217.
- Belknap, J. 1989, 'The economics-crime link', *Criminal Justice Abstracts*, March, pp. 140-157.
- Belsky, J. 1993, 'Etiology of child maltreatment: A developmental-ecological analysis', *Psychological Bulletin*, vol. 114, no. 3, pp. 413-434.
- Blumstein, A., Cohen, J., Roth, J. A. & Visher, C. A. (eds) 1986, *Criminal Careers and Career Criminals*, vol. 1, National Academy Press, Washington DC.
- Box, S. 1987, *Recession, Crime and Punishment*, MacMillan Education, London, pp. 68-229.
- Braithwaite, J. 1979, *Inequality, Crime and Public Policy*, Routledge and Kegan Paul, London.
- Braithwaite, J. 1988, *Crime, Shame and Reintegration*, Cambridge University Press, Cambridge.
- Burton, V. S. Jnr, Cullen, F. T., Evans, T. D., Dunaway, R. G., Kethineni, S. R. & Payne, G. L. 1995, 'The impact of parental controls on delinquency', *Journal of Criminal Justice*, vol. 23, no. 2, pp. 111-126.
- Caliso, J. A. & Milner, J. S. 1994, 'Childhood physical abuse, childhood social support, and adult child abuse potential', *Journal of Interpersonal Violence*, vol. 9, no. 1, pp. 27-44.
- Chaffin, M., Kelleher, K. & Hollenberg, J. 1996, 'Onset of physical abuse and neglect: Psychiatric, substance abuse, and social risk factors from prospective community data', *Child Abuse and Neglect*, vol. 20, no. 3, pp. 191-203.
- Chiricos, T. 1987, 'Rates of crime and unemployment: An analysis of aggregate research evidence', *Social Problems*, vol. 34, no. 2, pp. 187-212.
- Cloward, R. A. & Ohlin, L. E. 1960, *Delinquency and Opportunity: A Theory of Delinquent Gangs*, The Free Press, New York.
- Conger, R. D., Conger, K. J., Elder, G. H., Lorenz, F. O., Simons, R. L. & Whitbeck, L. B. 1992, 'A family process model of economic hardship and adjustment of early adolescent boys', *Child Development*, vol. 63, pp. 526-541.
- Coohey, C. 1995, 'Neglectful mothers, their mothers, and partners: The significance of mutual aid', *Child Abuse and Neglect*, vol. 19, no. 8, pp. 885-895.
- Coohey, C. 1996, 'Child maltreatment: Testing the social isolation hypothesis', *Child Abuse and Neglect*, vol. 20, no. 3, pp. 241-254.
- Cotterell, J. L. 1986, 'Work and community influences on the quality of child rearing', *Child Development*, vol. 57, pp. 362-374.
- Coulton, C. J., Korbin, J. E., Su, M. & Chow, J. 1995, 'Community level factors and child maltreatment rates', *Child Development*, vol. 66, pp. 1262-1276.
- Coulton, C. J. & Pandey, S. 1992, 'Geographic concentration of poverty and risk to children in urban neighborhoods', *American Behavioral Scientist*, vol. 35, no. 3, pp. 238-257.
- Coumarelos, C. 1994, *Juvenile Offending: Predicting Persistence and Determining the Cost-effectiveness of Interventions*, NSW Bureau of Crime Statistics and Research, Sydney.
- Creighton, S. & Noyes, P. 1989, *Child Abuse Trends in England and Wales 1983-1987*, NSPCC, London.
- Davis, S. K. 1990, 'Chemical dependency in women: A description of its effects and outcome on adequate parenting', *Journal of Substance Abuse Treatment*, vol. 7, pp. 225-232.
- Dore, M. M. 1993, 'Family preservation and poor families: When "homebuilding" is not enough', *Families in Society: The Journal of Contemporary Human Services*, pp. 545-556.

- Dore, M. M., Doris, J. M. & Wright, P. 1995, 'Identifying substance abuse in maltreating families: A child welfare challenge', *Child Abuse and Neglect*, vol. 19, no. 5, pp. 531-543.
- Durkin, M. S., Davidson, L. L., Kuhn, L., O'Connor, P. & Barlow, B. 1994, 'Low-income neighborhoods and the risk of severe pediatric injury: A small-area analysis in northern Manhattan', *American Journal of Public Health*, vol. 84, no. 4, pp. 587-592.
- Elder, G. H., Van Nguyen, T. & Caspi, A. 1985, 'Linking family hardship to children's lives', *Child Development*, vol. 56, pp. 361-375.
- Elliott, D. S., Huizinga, D. & Ageton, S. S. 1985, *Explaining Delinquency and Drug Use*, Sage Publications, Beverley Hills, California.
- Farrington, D. P., Loeber, R., Elliott, D. S., Hawkins, J. D., Kandel, D. B., Klein, M. W., McCord, J., Rowe, D. C. & Tremblay, R. E. 1990, 'Advancing knowledge about the onset of delinquency and crime', in *Advances in Clinical Child Psychology*, vol. 13, eds B. B. Lahey & A. E. Kazdin, Plenum Press, New York.
- Garbarino, J. & Kostelny, K. 1992, 'Child maltreatment as a community problem', *Child Abuse and Neglect*, vol. 16, pp. 455-464.
- Garbarino, J. & Sherman, D. 1980, 'High-risk neighborhoods and high-risk families: The human ecology of child maltreatment', *Child Development*, vol. 51, pp. 188-198.
- Gaudin, J. M. Jnr, Polansky, N. A., Kilpatrick, A. C. & Shilton, P. 1996, 'Family functioning in neglectful families', *Child Abuse and Neglect*, vol. 20, no. 4, pp. 363-377.
- Giovannoni, J. M. & Billingsley, A. 1970, 'Child neglect among the poor: A study of parental adequacy in families of three ethnic groups', *Child Welfare*, vol. 49, pp. 196-206.
- Greenwood, P., Model, K., Rydell, C. & Chiesa, J. 1996, *Diverting Children from a Life of Crime: Measuring Costs and Benefits*, RAND Corporation, Santa Monica, California.
- Gregory, R. G. & Hunter, B. 1995, *The Macro Economy and the Growth of Ghettos and Urban Poverty in Australia*, Discussion Paper No. 325, Centre for Economic Policy Research, Australian National University.
- Guerry 1833 cited in Morris, T. 1957, *The Criminal Area*, Routledge & Kegan Paul, New York, pp. 42-53, reprinted in Voss, H. L. & Peterson, D. M. (eds) 1971, *Ecology, Crime and Delinquency*, Appleton-Century-Crofts, New York, pp. 47-64.
- Hampton, R. & Newberger, E. 1985, 'Child abuse incidence and reporting by hospitals: Significance of severity, class and race', *American Journal of Public Health*, vol. 78, pp. 56-60.
- Harrington, D., Dubowitz, H., Black, M. M. & Binder, A. 1995, 'Maternal substance use and neglectful parenting: Relations with children's development', *Journal of Clinical Child Psychology*, vol. 24, no. 3, pp. 258-263.
- Harris, K. M. & Marmer, J. K. 1996, 'Poverty, paternal involvement and adolescent well-being', *Journal of Family Issues*, vol. 17, no. 5, pp. 614-640.
- Hubbs-Tait, L., Osofsky, J. D., Hann, D. M. & Culp, A. 1994, 'Predicting behavior problems and social competence in children of adolescent mothers', *Family Relations*, vol. 43, pp. 439-446.
- Human Rights and Equal Opportunity Commission 1997, *Bringing Them Home*, Report of the National Inquiry into the Separation of Aboriginal and Torres Strait Islander Children from their Families, Human Rights and Equal Opportunity Commission, Sydney.
- Jaudes, P. K., Ekwo, E. & Van Voorhis, J. 1995, 'Association of drug abuse and child abuse', *Child Abuse and Neglect*, vol. 19, no. 9, pp. 1065-1075.
- Johnson, R. A., Su, S. S., Gerstein, D. R., Shin, H. C. & Hoffmann, J. P. 1995, 'Parental influences on deviant behavior in early adolescence: A logistic response analysis of age- and gender- differentiated effects', *Journal of Quantitative Criminology*, vol. 11, no. 2, pp. 167-193.
- Kakar S., 1994, Child abuse and its consequences for an early onset of juvenile delinquency: A prospective cohort study, paper presented at the 10th Annual Conference of the Australian and New Zealand Society of Criminology, Sydney, 27-30 Sep.
- Kang, K. M. & Seneta, E. 1980, 'Path analysis: An exposition', in *Developments in Statistics, Volume 3*, ed. P. R. Krishnaiah, Academic Press, New York.
- Kelley, S. J. 1992, 'Parenting, stress and child maltreatment in drug-exposed children', *Child Abuse and Neglect*, vol. 16, pp. 37-328.

- Kotch, J. B., Browne, D. C., Ringwalt, C. L., Stewart, P. W., Ruina, E., Holt, K., Lowman, B. & Jung, J. 1995, 'Risk of child abuse or neglect in a cohort of low-income children', *Child Abuse and Neglect*, vol. 19, no. 9, pp. 1115-1130.
- Krishnan, V. & Morrison, K. B. 1995, 'An ecological model of child maltreatment in a Canadian province', *Child Abuse and Neglect*, vol. 19, no. 1, pp. 101-113.
- Lacharité, C., Ethier, L. & Couture, G. 1996, 'The influence of partners on parental stress of neglectful mothers', *Child Abuse Review*, vol. 5, pp. 18-33.
- Lahey, B. B., Conger, B. M., Atkeson, B. M. & Treiber, F. A. 1984, 'Parenting behavior and emotional status of physically abusive mothers', *Journal of Consulting and Clinical Psychology*, vol. 52, no. 6, pp. 1062-1071.
- Larzelere, R. E. & Patterson, G. R. 1990, 'Parental management: Mediator of the effect of socioeconomic status on early delinquency', *Criminology*, vol. 28, no. 2, pp. 301-323.
- Lempers, J., Clark-Lempers, D. & Simons, R. 1989, 'Economic hardship, parenting and distress in adolescence', *Child Development*, vol. 60, pp. 25-49.
- Loeber R., & Stouthamer-Loeber, M. 1986, 'Family factors as correlates and predictors of juvenile conduct problems and delinquency', in *Crime and Justice: An Annual Review of Research*, vol. 7, eds M. Tonry & N. Morris, The University of Chicago, Chicago, pp. 29-149.
- Mak, A. S. 1994, 'Parental neglect and overprotection as risk factors in delinquency', *Australian Journal of Psychology*, vol. 46, no. 2, pp. 107-111.
- Martens, P. 1992, *Family, Environment and Delinquency*, National Council for Crime Prevention, Stockholm, Sweden.
- Martin, E. P. & Martin, J. M. 1978, *The Black Extended Family*, University of Chicago Press, Chicago.
- Martin, M. J. & Walters, J. 1982, 'Familial correlates of selected types of child abuse and neglect', *Journal of Marriage and the Family*, May, pp. 267-276.
- McCord, J. 1979, 'Some child-rearing antecedents of criminal behaviour in adult men', *Journal of Personality and Social Psychology*, vol. 37, pp. 1477-1486.
- McCord, J. 1980, 'Patterns of deviance', in *Human Functioning in Longitudinal Perspective*, eds S. B. Sells, R. Crandall, M. Roff, J. S. Strauss, & W. Pollin, Williams and Wilkins, Baltimore, pp. 157-162.
- McCord, J. 1983, 'A forty year perspective on effects of child abuse and neglect', *Child Abuse and Neglect*, vol. 7, pp. 265-279.
- McLoyd, V. C. & Wilson, L. 1990, 'Maternal behavior, social support, and economic conditions as predictors of distress in children', in *Economic Stress: Effects on Family Life and Child Development*, eds V. C. McLoyd & C. A. Flanagan, Jossey-Bass, San Francisco.
- Merton, R. K. 1968, *Social Theory and Social Structure*, The Free Press, Glencoe, Illinois.
- Mukherjee, S. K. & Dagger, D. 1990, *The Size of the Crime Problem in Australia*, 2nd edn, Australian Institute of Criminology, Canberra, p. 24.
- Murray, C. 1984, *Losing Ground: American Social Policy, 1950-1980*, Basic Books, New York.
- National Center on Child Abuse and Neglect 1988, *Study Findings: Study of National Incidence and Prevalence of Child Abuse and Neglect: 1988*, US Department of Health and Human Services, Office of Human Development Services, Administration for Children, Youth and Families, Children's Bureau, Washington DC.
- Nelson, K. E., Saunders, E. J. & Landsman, M. J. 1993, 'Chronic child neglect in perspective', *Social Work*, vol. 38, no. 6, pp. 661-671.
- Ney, P. G., Fung, T. & Wickett, A. R. 1994, 'The worst combinations of child abuse and neglect', *Child Abuse and Neglect*, vol. 18, no. 9, pp. 705-714.
- Pett, M. A., Vaughan-Cole, B. & Wampold, B. E. 1994, 'Maternal employment and perceived stress: Their impact on children's adjustment and mother-child interaction in young divorced and married families', *Family Relations*, vol. 43, pp. 151-158.
- Quetelet, A. 1831 cited in Morris, T. 1957, *The Criminal Area*, Routledge & Kegan Paul, New York, pp. 42-53, reprinted in Voss, H. L. & Peterson, D. M. (eds) 1971, *Ecology, Crime and Delinquency*, Appleton-Century-Crofts, New York, pp. 47-64.
- Rankin, J. H. & Kern, R. 1994, 'Parental attachments and delinquency', *Criminology*, vol. 32, no. 4, pp. 495-515.

- Salmelainen, P. 1996, *Child Neglect: Its Causes and its Role in Delinquency*, Crime and Justice Bulletin No. 33, NSW Bureau of Crime Statistics and Research, Sydney.
- Sampson, R. J. & Laub, J. H. 1994, 'Urban poverty and the family context of delinquency: A new look at structure and process in a classic study', *Child Development*, vol. 65, pp. 523-540.
- Sampson, R. J. & Wilson, W. J. 1995, 'Toward a theory of race, crime, and urban inequality', in *Crime and Inequality*, eds J. Hagan & R. D. Peterson, Stanford University Press, Stanford, California.
- Sherman, L. 1997, *Preventing Crime: What Works, What Doesn't, What's Promising*, Office of Justice Programs, US Department of Justice.
- Silbereisen, R. K., Walper, S. & Albrecht, H. T. 1990, 'Family income loss and economic hardship: Antecedents of adolescents' problem behaviour', in *Economic Stress: Effects on Family Life and Child Development*, eds V. C. McLoyd & C. A. Flanagan, Jossey-Bass, San Francisco, pp. 27-47.
- Simons, R. L. & Robertson, J. F. 1989, 'The impact of parenting factors, deviant peers, and coping style upon adolescent drug use', *Family Relations*, vol. 38, pp. 273-281.
- Simons, R. L., Robertson, J. F. & Downs, W. R. 1989, 'The nature of the association between parental rejection and delinquent behavior', *Journal of Youth and Adolescence*, vol. 18, no. 3, pp. 297-310.
- Smith, C. & Thornberry, T. P. 1995, 'The relationship between childhood maltreatment and adolescent involvement in delinquency', *Criminology*, vol. 33, no. 4, pp. 451-481.
- Spearly, J. L. & Lauderdale, M. 1983, 'Community characteristics and ethnicity in the prediction of child maltreatment rates', *Child Abuse and Neglect*, vol. 7, pp. 91-105.
- Thornberry, T. P., Lizotte, A. J., Krohn, M. D., Farnworth, M. & Jang, S. J. 1991, 'Testing interactional theory: An examination of reciprocal causal relationships among family, school, and delinquency', Rochester Youth Development Study, *The Journal of Criminal Law & Criminology*, vol. 82, no. 1, pp. 3-33.
- Tomison, A. 1996a, *Child Maltreatment and Substance Abuse*, National Child Protection Clearing House Discussion Paper, Australian Institute of Family Studies, Melbourne.
- Tomison, A. 1996b, *Child Maltreatment And Family Structure*, National Child Protection Clearing House Discussion Paper, Australian Institute of Family Studies, Melbourne.
- Tremblay, R.E. & Craig, W.M. 1995, 'Developmental crime prevention', in *Building a Safer Society: Strategic Approaches to Crime Prevention*, Crime and Justice: A Review of Research, vol. 19, eds M. Tonry & D. P. Farrington, The University of Chicago Press, Chicago.
- Vaughn, M. S. 1991, 'The relationship between unemployment and crime in Japan from 1926 to 1988: Trends during Emperor Hirohito's reign', *International Journal of Comparative and Applied Criminal Justice*, vol. 15, no. 2, pp. 153-173.
- Vinson, T., Berreen, R. & McArthur, M. 1989, 'Class, surveillance and child abuse', *Impact*, April/May, pp. 19-21.
- Vondra, J. I. 1990, 'Sociological and ecological facts' in *Children at Risk: An Evaluation of Factors Contributing to Child Abuse and Neglect*, eds R. T. Ammerman & M. Hersen, Plenum Press, New York.
- Warr, M. 1993, 'Parents, peers, and delinquency', *Social Forces*, vol. 72, no. 1, pp. 247-264.
- Weintraub, K. J. & Gold, M. 1991, 'Monitoring and delinquency', *Criminal Behaviour and Mental Health*, vol. 1, pp. 268-281.
- Widom, C. S. 1989, 'Child abuse, neglect, and violent criminal behavior', *Criminology*, vol. 27, no. 2, pp. 251-271.
- Wilson, W. J. 1987, *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy*, University of Chicago Press, Chicago.
- Wilson, J. Q. & Herrnstein, R. J. 1985, *Crime and Human Nature*, Simon and Schuster, New York.
- Young, L., Baker, J. & Monnone, T. 1989, *Poverty and Child Abuse in the Sydney Metropolitan Area*, NSW Department of Community Services, pp. 1-19.
- Young, G. & Gately, T. 1988, 'Neighborhood impoverishment and child maltreatment', *Journal of Family Issues*, vol. 9, no. 2, pp. 240-254.
- Zuravin, S. 1986, 'Residential density and urban child maltreatment: An aggregate analysis', *Journal of Family Violence*, vol. 1, no. 4, pp. 307-322.
- Zuravin, S. J. & DiBlasio, F. A. 1996, 'The correlates of child physical abuse and neglect by adolescent mothers', *Journal of Family Violence*, vol. 11, no. 2, pp. 149-166.

APPENDIX

List of offence types classified as *property* offences and *violent* offences in the measures of juvenile participation in crime.

Property offences	Violent offences
robbery	murder
extortion	attempted murder
break and enter	conspire to murder
misappropriation	manslaughter
motor vehicle theft	drive cause death
stealing	assault
shoplifting	sexual assault
arson (no person inside)	indecent assault
property damage	other sex offences
	kidnap/abduct
	arson (person inside)
	other offences against the person