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How many of the offspring born to teenage fathers are produced by repeat serious delinquents?

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ABSTRACT

Introduction Recent studies have found an association between teenage fatherhood and delinquency. Yet, it is not clear whether there is a dose–response relationship between the severity of delinquency and teenage fatherhood. This paper quantifies the public health impact of serious delinquency on the risk of impregnation and teenage fatherhood among urban, adolescent males.

Methods Using data up to age 19, rates of sexual activity, impregnation and fatherhood are compared among three groups: minor/non-delinquents, moderate delinquents and repeat serious delinquents.

Results The results demonstrate a dose–response relationship between delinquency and age of onset of sexual activity, whereby more serious delinquents began having sex at younger ages. By age 19, almost half of repeat serious delinquents (46.7%) had caused a pregnancy, and nearly a third (31.4%) had fathered children. Rates of impregnation and fatherhood were twice as high among repeat serious delinquents compared with moderate and minor/non-delinquents. Repeat serious delinquents were also more likely than others to father multiple children; of the children produced by teenage fathers in this study, almost two-thirds (65%) were fathered by repeat serious delinquents. During late adolescence, repeat serious delinquents continued to be at greater risk for fathering children, as they were continuing to have unsafe sex more frequently and with more partners.

Conclusions Repeat serious delinquents comprise a crucial but hard-to-reach population for family planning services and parenthood education. Programmes and services for teenage pregnancy prevention need extra funding and efforts to address this population, in terms of both the primary prevention of pregnancy and the prevention of repeat pregnancies.

Introduction

Rates of teenage pregnancy in the United States increased dramatically during the late 1980s and, although they have declined somewhat in recent years,

they continue to be higher in the USA than in other industrialized nations (Spitz et al., 1996; Alan Guttmacher Institute, 2001). Most of the research in the area of teenage pregnancy has focused on teenage mothers, and until recently, much less was known about teenage fathers. According to national surveys, the rate of teenage fatherhood ranges from 2% to 7% (Elster et al., 1987; Marsiglio, 1987; Sonenstein et al., 1993; Ventura et al., 1999). However, teenage fatherhood is much more common in urban areas, where as many as 15–20% of adolescent males have fathered children (Marsiglio, 1987; Hardy and Duggan, 1988; Sonenstein et al., 1993; Thornberry et al., 1997; Wei, 1999). Also, studies have consistently shown that African-Americans are over-represented among teenage fathers (Elster et al., 1987; Ketterlinus et al., 1992; Sonenstein et al., 1993; Thornberry et al., 1997).

A growing body of research reports that teenage fathers, in contrast with males who do not become teenage fathers, are more likely to engage in delinquent behaviour (Elster et al., 1987; Ketterlinus et al., 1992; Resnick et al., 1993; Dearden et al., 1995; Thornberry et al., 1997; Fagot et al., 1998; Stouthamer-Loeber & Wei, 1998; Thornberry et al., 2000). The types and severity of delinquency measured vary widely across studies, ranging from minor theft and aggressive behaviour in school, to arrests, gang membership and violence. In comparing fathers with non-fathers, these studies have demonstrated that a relationship exists between delinquency and teenage fatherhood. However, several questions remain unanswered, such as whether delinquency seriousness has a dose–response relationship with teenage fatherhood. While many adolescent males engage in some delinquency, few escalate to the level of repeatedly engaging in the most serious forms. Hence, it is important to focus on those for whom the costs and consequences are the greatest.

The possible dose–response association between delinquency and teenage fatherhood is also backed by studies showing that delinquents begin having sex at earlier ages and are more promiscuous (Ketterlinus et al., 1992; Costa et al., 1995). Studies of incarcerated juvenile offenders also report high rates of promiscuity, and rates of fatherhood ranging from 20% to 26% (McLaughlin et al., 1999; Nesmith et al., 1997).

While the consequences of serious delinquency are considerable, they are likely to be even worse when joined by early childbearing, as future generations are also affected. Young fathers who engage in crime are likely to have poor parenting skills. Hence, knowledge of the degree of association between repeated serious delinquency and teenage fatherhood has important public health implications for the prevention and intervention of the intergenerational transmission of antisocial behaviour, as well as being an important step toward understanding the consequences of serious delinquency during adolescence. It is also unclear whether severity of delinquency is associated with fatherhood similarly across racial groups.

In order to inform prevention and intervention efforts, epidemiologic methods can be applied to describe the occurrence of teenage fatherhood

among repeat serious delinquents, illustrate the strength of association between repeated serious delinquency and teenage fatherhood, and quantify the potential public health impact of repeated serious delinquency on teenage fatherhood. Epidemiologic measures such as the odds ratio and the attributable risk have the benefit of being easily interpretable. The attributable risk can be used to assess the utility of certain prevention and intervention programmes, by indicating how much of an effect the reduction of serious delinquency is likely to have on reducing the occurrence of teenage fatherhood.

This paper addresses the following questions:

- Is there a dose–response relationship between delinquency seriousness and teenage fatherhood whereby increasing levels of delinquency is associated with increasing risk of teenage fatherhood?
- What is the excess risk of teenage fatherhood attributable to repeated serious delinquency?
- Is the effect of repeated serious delinquency on impregnation and teenage fatherhood similar for African-American and Caucasian males?
- Among teenage fathers, are repeat serious delinquents less involved with their children?
- And, lastly, during late adolescence, does delinquency seriousness have a dose–response relationship with risky sexual behaviour?

Methods

Participants

The present investigation focuses on the oldest sample of the Pittsburgh Youth Study, who were in seventh grade when the study began ($n = 506$). At the first assessment, half of the participants were African-American and half were Caucasian; 40% lived with a single parent and 40% of the caretakers received public assistance. The data used for this paper come from the first 10 assessments, which cover ages 13–19. Attrition has been low, and at the tenth assessment (Phase M), the participation rate was 89.7%. For this paper, data from the initial six-month assessments were combined to reflect behaviours occurring in the past year. Details of the study design, sample selection and assessments can be found in Loeber et al. (1998).

Measures

Information concerning delinquent behaviours was collected from the participants using the Self-Reported Delinquency Scale (SRD) (Elliott et al., 1985) and the Extended Youth Self Report (YSR) (Achenbach and Edelbrock, 1987). Information about delinquency was also collected from the caretakers using the Extended Child Behavior Checklist (CBCL) (Achenbach, 1978;

Achenbach and Edelbrock, 1979, 1983), and from the teachers, by the Extended Teacher Report Form (TRF) (Edelbrock and Achenbach, 1984). When possible, information from multiple informants was combined.

The Sexual Activity Questionnaire was adapted from the one developed at the Institute for Behavioral Science in Boulder, Colorado. Information regarding girlfriends, sexual activity, contraceptive use, impregnation, fatherhood status and contact with offspring was assessed yearly starting at age 16. At the age 16 assessment, participants were asked if they had *ever* had sexual intercourse with a girl or woman. If they had, they were asked how old they were the first time they had sexual intercourse. Subsequent assessments asked whether participants had sexual intercourse during the past year. Age of onset of sexual activity was determined by combining retrospective and prospective reports. Participants were also asked if they had ever caused a pregnancy and if so, the outcome of the pregnancy or pregnancies. If the pregnancy resulted in a live birth, these fathers were asked how many children they had, and how involved they were with their children (i.e. whom the children lived with, whether they provided financial support, and how often they spent time with their children). For this paper, the outcomes of sexual activity and fatherhood are drawn from the tenth assessment, when participants were an average of 19 years old. Impregnation was defined as having ever made a girl or woman pregnant by age 19; teenage fatherhood status was defined as having fathered a child by age 19.

Analyses

Using data from ages 13–19, participants were classified into three groups based on the delinquency seriousness classification system developed by Wolfgang et al. (1985). Participants were considered *repeat serious delinquents* ($n = 179$) if they reported engaging in one or more of the following delinquent behaviours for *at least two* of the first seven yearly assessments (the behaviours did not have to occur in consecutive years): auto theft, breaking and entering, selling drugs, strong-arming (robbery), assault with weapon/intent to seriously harm or kill, or rape/forced sex. In order to avoid false negative classifications, those who were not classified as repeat serious delinquents *and* who missed one or more assessments were excluded. Thus, the next comparison group, the *moderate delinquents* ($n = 153$), comprised participants who were interviewed during every phase and who reported ever engaging in the following acts: theft of items worth more than US\$5, fencing (buying or selling stolen goods), pick-pocketing/purse-snatching, theft from a car, gang fighting, carrying weapons, or joyriding. In addition, those who engaged in serious delinquency only once were also considered moderate delinquents. *Minor/non-delinquents* ($n = 92$) were the third comparison group, consisting of those who were interviewed at every assessment and had never engaged in forms of delinquency beyond the following acts: shoplifting, minor

property damage, theft of items worth less than \$5, minor fraud (e.g. not paying for a bus ride), or minor delinquency at home. The resulting sample ($n = 425$) consisted of 84% of the original sample. Participants who were excluded did not differ significantly from those included in terms of race, neighbourhood socioeconomic status (SES), or high-risk status.

In applying epidemiologic terms and methods, repeated serious delinquency is considered the 'exposure' to the risk factor, and although not quite the appropriate term, impregnation and teenage fatherhood are considered the 'disease', or outcomes of interest. However, the intention is not to establish a cause and effect relationship between delinquency and fatherhood, but rather to quantify their association in the population. The following measures of association were calculated to describe the relationship between repeated serious delinquency and impregnation, and between repeated serious delinquency and teenage fatherhood. The odds ratio (OR) estimates the magnitude of an association between exposure and the outcome. The OR indicates the likelihood of developing the outcome in the exposed group relative to those who are not exposed. The attributable risk (AR) is the difference in the rate of the outcome between the exposed and unexposed groups, and it provides information about the absolute effect, or excess risk associated with the exposure ($AR = \text{prevalence of disease among exposed} - \text{prevalence of disease among unexposed}$). The attributable risk percentage (AR%) is a function of the relative risk (RR) as estimated by the odds ratio, and indicates the excess risk of disease for individuals with the exposure ($AR\% = ((RR-1) / RR) \times 100$). The population attributable risk percent (PAR%) takes the relative risk ratio (odds ratio) and the proportion of cases with exposure (P_E) into account, and estimates the excess rate of disease in the total study population that is attributable to the exposure ($PAR\% = AR\% \times P_E$); Hennekens and Buring, 1987).

Thus, the AR refers to the rate of impregnation or fatherhood attributable to repeated serious delinquency among repeat serious delinquents, and is helpful for shaping intervention services. The PAR%, on the other hand, reflects the proportion attributable to repeated serious delinquency in the total population, and is useful for planning primary prevention programs. In order to assess whether the relationship between repeated serious delinquency and impregnation or teenage fatherhood is similar for African-Americans and Caucasians, odds ratios, attributable risks and population attributable risks are calculated separately for the two racial groups. In addition, race was adjusted for using a Mantel Haenszel adjustment, and an adjusted odds ratio is reported. For all remaining comparisons (all two-tailed), differences in means were tested using one-way ANOVA and differences in proportions were tested using chi-square statistics. If the three groups were significantly different, two post-hoc comparisons tested whether the significant difference was between the repeat serious versus moderate delinquents (i.e. an effect for repeated serious delinquency) or whether moderate delinquents were significantly different from minor/non-delinquents (i.e. an effect for delinquency in general). Since

higher risk boys were over-sampled, all percentages and analyses were weighted to reflect population rates.

Results

The prevalence of repeated serious delinquency from ages 13 to 19 was 35.4%. On average, repeat serious delinquents reported engaging in serious delinquency over three yearly assessments (38% engaged in serious delinquency for two years only, 43% for 3–4 years, and 19% for 5–7 years). Half (49.7%) of the repeat serious delinquents were also repeat *violent* offenders who had engaged in robbery, aggravated assault, or rape/sexual assault on more than one occasion. There were racial/ethnic differences in the prevalence of delinquency seriousness. Among African-Americans, more than half (52.4%) were repeat serious delinquents, 30.2% were moderate delinquents, and 17.3% were minor/non-delinquents. In comparison, 27.8% of Caucasians were repeat serious delinquents, 44.3% were moderate delinquents, and 27.8% were minor/non-delinquents ($\chi^2 = 25.6, p < 0.001$).

Delinquency seriousness was significantly associated with earlier ages of onset of sexual activity (mean ages of onset = 13.3 for repeat serious delinquents, 14.4 for moderate delinquents, and 15.6 for minor/non-delinquents ($F_{(2, 381)} = 31.0, p < 0.001$). Post-hoc analyses revealed a significant dose-response relationship; repeat serious delinquents had a significantly earlier age of onset than moderate delinquents ($T_{(2, 208)} = 3.9, p < 0.001$), and moderate delinquents had a significantly earlier age of onset than minor/non-delinquents ($T_{(2, 309)} = 4.4, p < 0.001$).

Figure 1 shows the cumulative age of onset of sexual activity by delinquency level; by age 15, 89.3% of repeat serious delinquents had become sexually active, compared with 66.5% of moderate and 38.1% of non-/minor delinquents. Hence, delinquency seriousness was related to earlier ages of onset of sexual activity and therefore to a longer period of risk for causing a pregnancy.

As shown in Figure 2, rates of impregnation and fatherhood by age 19 were twice as high among repeat serious delinquents as compared with moderate and non-/minor delinquents.

Almost half of the repeat serious delinquents (46.7%) had caused a pregnancy, compared with 21.9% of moderate delinquents and 19.6% of minor/non-delinquents ($\chi^2 = 30.8, p < 0.001$). Almost a third (31.4%) of repeat serious delinquents had fathered children by age 19, compared with 14.6% of moderate delinquents and 14.1% of minor/non-delinquents ($\chi^2 = 17.1, p < 0.001$). Rates of impregnation and fatherhood were similar between the moderate and minor/non-delinquents. Therefore, these two groups were combined for the purpose of comparison with the repeat serious delinquent group in determining the contribution of repeated serious delinquency on risk for impregnation and fatherhood.

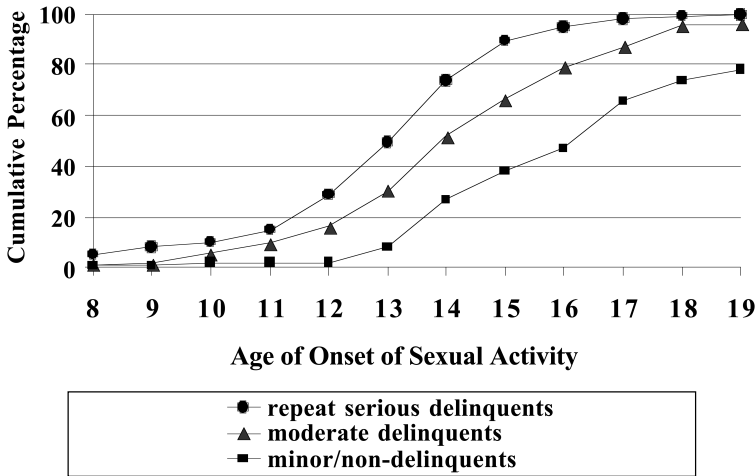


Figure 1: Cumulative age of onset of sexual activity by delinquency level.

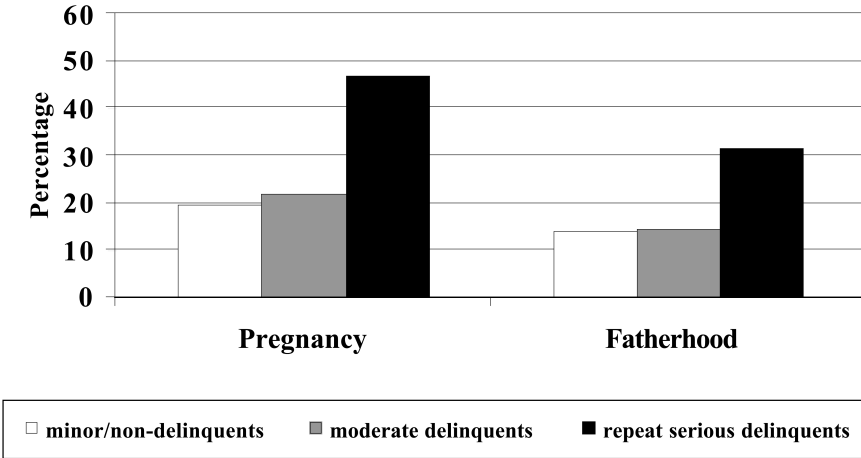


Figure 2: Impregnation and fatherhood by delinquency level by age 19.

Compared with less serious delinquents, repeat serious delinquents were more than three times more likely to have made someone pregnant (OR = 3.3, 95% CI = 2.2–5.1), and almost three times as likely to become teenage fathers (OR = 2.7, 95% CI = 1.7–4.4). Racial/ethnic differences were also apparent in the prevalence of impregnation and fatherhood. Rates of impregnation were 15.0% among Caucasians and 43.1% among African-

Americans, making African-Americans more than four times as likely as Caucasians to have caused a pregnancy (OR = 4.3, 95%CI = 2.7–6.8). Similarly, rates of teenage fatherhood were 9.7% among Caucasians and 30.0% among African-Americans, with African Americans being four times as likely as Caucasians to become teenage fathers (OR = 4.0, 95% CI = 2.3–6.8). However, the association between repeated serious delinquency and teenage fatherhood remained statistically significant after adjusting for race (OR_{adj} = 2.2, 95% CI = 1.3–3.6), indicating that the association is not simply an artefact of there being a higher prevalence of both repeated serious delinquency and fatherhood among African-Americans. This was also the case for impregnation (OR_{adj} = 2.7, 95% CI = 1.7–4.2).

Table 1 shows the epidemiologic measures of association describing the relationship between repeated serious delinquency and impregnation, and between repeated serious delinquency and teenage fatherhood.

The attributable risk (AR), or excess rate of impregnation among repeat serious delinquents, was 0.26. The attributable risk percentage (AR%) indicates that within this group of repeat serious delinquents, 69.7% of the pregnancies were attributable to their repeated serious delinquency. Taking into account the proportion of ‘exposed’ cases (61% of males who caused a pregnancy were repeat serious delinquents), 42% of pregnancies were attributable to repeated serious delinquency *in the total study population*. The relationship between repeated serious delinquency and impregnation was statistically significant among both African-Americans (OR = 2.3, 95% CI = 1.4–3.9) and Caucasians (OR = 4.0, 95% CI = 1.7–9.2), with repeated serious delinquency having a slightly greater impact on rates of impregnation among Caucasians (PAR% = 40%) than among African-Americans (PAR% = 36%).

Turning to teenage fatherhood, the absolute attributable risk was 0.17. The percentage of risk attributable to repeated serious delinquency was 63.3%

	OR	(95% CI)	AR	AR%	P _E	PAR%
Impregnation:	3.3	(2.2–5.1)	0.26	69.7%	0.61	42.4%
African-Americans (n = 238)	2.3	(1.4–3.9)	0.20	56.6%	0.63	35.5%
Caucasians (n = 175)	4.0	(1.7–9.2)	0.21	74.9%	0.54	40.1%
Fatherhood:	2.7	(1.7–4.4)	0.17	63.3%	0.60	38.2%
African-Americans (n = 238)	2.3	(1.3–4.0)	0.17	55.7%	0.65	36.1%
Caucasians (n = 175)	2.0	(0.7–5.6)	0.07	50.0%	0.41	20.6%

Notes: AR = attributable risk; P_E = prevalence of exposure (repeated serious delinquency) among teenage fathers; AR% = attributable risk percentage; PAR% = population attributable risk percentage

among the teenage fathers. Taking into account a prevalence of repeated serious delinquency of 60% among teenage fathers, more than a third (38%) of teenage fatherhood was attributable to repeated serious delinquency in the total study population. Although the association of repeated serious delinquency with impregnation did not differ between African-Americans and Caucasians, the association of repeated serious delinquency with fatherhood did. Among African-Americans, repeat serious delinquents were significantly more likely to become teenage fathers (OR = 2.3, 95% CI = 1.3–4.0). However, repeated serious delinquency was not statistically associated with teenage fatherhood among Caucasians (OR = 2.0, 95% CI = 0.7–5.6). Accordingly, the proportion of teenage fatherhood attributable to repeated serious delinquency among African-Americans was much higher than that among Caucasians (PAR% = 36% and 21%, respectively).

On average, the teenage fathers became fathers at age 17. Age of fatherhood did not differ according to delinquency level. Although repeat serious delinquents did not become fathers at younger ages, a considerable portion fathered multiple children. Repeat serious delinquents comprised the majority (70%) of the teenage fathers who fathered more than one child (10% were moderate delinquents and 20% were minor/non-delinquents). In addition, by age 19, repeat serious delinquents were the only group who had fathered more than two children (range = three to seven children). In total, the teenage fathers from this study produced 162 children. The public health impact of repeated serious delinquency is further illustrated by the fact that almost two-thirds (65%, $n = 106$) of these children were fathered by repeat serious delinquents.

Across all young fathers, involvement with their offspring was rather low. Delinquency seriousness was not related to a teenage father's likelihood of living with his children. Among teenage fathers ($n = 81$), similar proportions of serious, moderate, and non-/minor delinquents lived with their children (29.8%, 22.7% and 33.3%, respectively). However, among fathers who did not live with their children, 5.9% of moderate delinquents and 12.9% of repeat serious delinquents reported they *never* saw their children. In fact, delinquency seriousness was significantly associated with a decreased likelihood of seeing their children every day. Among fathers not residing with their children, 50.0% of non-/minor delinquents visited their children on a daily basis, while 38.9% of moderate delinquents and only 12.9% of serious delinquents did so ($\chi^2 = 6.2$, $p < 0.05$). In addition, delinquency seriousness was also significantly associated with a lower likelihood of a teenage father providing financial support for his children. Among fathers not living with their children, all (100%) of non-/minor delinquents, 83.3% of moderate delinquents, and 67.7% of serious delinquents reported they provided some financial support to their children ($\chi^2 = 3.9$, $p < 0.05$).

Of the fathers, a considerable proportion of repeat serious delinquents (18.8%, $n = 9$) were incarcerated at the time of their age 19 interview, which

also contributed to their being less likely to report involvement with their children. In comparison, only one moderate delinquent (4.5%), and none of the minor/non-delinquents were interviewed in jail ($\chi^2 = 4.6, p < 0.05$).

Table 2 shows a linear association between delinquency level and sexual activity reported at age 19.

Delinquency seriousness was significantly related to sexual activity; as delinquency seriousness increased, so did the proportion of participants who reported being sexually active in the past year ($\chi^2 = 29.1, p < 0.001$). Post-hoc analyses indicate the proportion of sexually active serious delinquents did not differ significantly from that of moderate delinquents, but moderate delinquents were more likely to have been sexually active during the past year than minor/non-delinquents ($\chi^2 = 15.8, p < 0.001$). Increasing delinquency seriousness was significantly associated with having sex more frequently ($F_{(2,398)} = 17.8, p < 0.001$). Serious delinquents reported having sex an average of 94 times during the past year, more than twice the average frequency reported by moderate delinquents ($T_{(2,306)} = -4.5, p < 0.001$). Frequency of sex during the past year did not differ between moderate and non-/minor delinquents. Seriousness of delinquency was also associated with having more partners during the past year ($F_{(2,341)} = 4.8, p < 0.01$). Post-hoc analyses demonstrated a statistically significant dose-response relationship between delinquency and number of sexual partners; repeat serious delinquents reported an average of 6.5 partners which was significantly greater than the number of partners reported by moderate delinquents (mean = 2.9, $T_{(2,278)} = -2.4, p < 0.05$), which was significantly higher than that among minor/non-delinquents (mean = 1.7, $T_{(2,195)} = -2.6, p < 0.01$). In accordance, the percentage of males who had one sexual partner during the past year showed a significant inverse dose-response relationship whereby the proportion of repeat serious delin-

	Repeat serious delinquents (n = 158)	Moderate delinquents (n = 153)	Non-/minor delinquents (n = 92)	Post hoc:	
				Serious vs. moderate	Moderate vs. non-/minor
% had sex during past year	91.8	88.2	67.4 ***	ns	***
Among sexually active:					
Mean frequency of sex	94.0	45.3	33.2 ***	***	ns
Mean number of partners	6.5	2.9	1.7 **	*	**
% one sexual partner	29.7	49.3	64.5 ***	**	*
% consistent contraceptive use	57.2	67.4	82.5 **	ns	*
% consistent condom use	45.5	54.1	59.7	ns	ns

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

quents who had one sexual partner was significantly lower than the proportion among moderate delinquents ($\chi^2 = 11.2, p < 0.01$), and the proportion among moderate delinquents was significantly lower than that among non-/minor delinquents ($\chi^2 = 4.0, p < 0.05$). Delinquency seriousness was also inversely associated with consistent contraceptive use. Just over half of repeat serious delinquents (57.2%) reported always using a condom or always knowing their partner was protected from becoming pregnant, compared with 67.4% of moderate and 82.5% of non-/minor delinquents ($\chi^2 = 12.7, p < 0.01$). Post-hoc rates of consistent contraceptive use did not differ significantly between serious and moderate delinquents; minor/non-delinquents were significantly more likely to use contraceptives consistently than moderate delinquents ($\chi^2 = 4.9, p < 0.05$). In sum, delinquency seriousness was associated with risky sexual behaviour during late adolescence, with repeat serious delinquents continuing to be at greater risk for causing a pregnancy. Overall, the proportion who reporting *always* using a condom was fairly low (45.5–59.7%), indicating that many of the participants, and more than half of repeat serious delinquents, were also at risk for sexually transmitted diseases. However, this was not addressed in this paper, as self-reports of sexually transmitted diseases were very low.

Discussion

Consistent with the findings of other studies, juvenile delinquency was significantly associated with impregnation and teenage fatherhood. However, unlike other studies, this paper addressed whether impregnation and fatherhood were associated with the *severity* of delinquency. Moderate delinquents and minor/non-delinquents had similar rates of impregnation and teenage fatherhood. However, rates of impregnation and teenage fatherhood were twice as high among repeat serious delinquents. Thus, delinquency seriousness did not have a dose–response relationship with the likelihood of causing a pregnancy or becoming a teenage father. Instead, repeated serious delinquency, but not delinquency in general, was associated with impregnation and fatherhood. In quantifying the impact of this association, this paper revealed that 42% of the excess risk for impregnation and 38% of the excess risk for teenage fatherhood was attributable to repeated serious delinquency in the study population. The association between repeated serious delinquency and impregnation was slightly stronger among Caucasians than African-Americans, while the association between repeated serious delinquency and fatherhood was much stronger among African-Americans than among Caucasians. However, it should be noted that there was less statistical power to test for associations among Caucasians, as the number of Caucasian teenage fathers was much smaller.

Repeat serious delinquents were not only more likely to father children during adolescence; many had fathered multiple children, accounting for 65%

of the offspring produced by teenage fathers. Thus, not only are repeat serious delinquents responsible for the bulk of crimes committed by juveniles, they also contribute to a considerable proportion of teenage pregnancies. Overall, levels of involved fatherhood were low, with slightly less than one-third of teenage fathers living with their children. Among the fathers who were not living with their children, repeat serious delinquents were less likely than others to spend time with their children.

In the examination of a dose–response relationship between the severity of juvenile delinquency and sexual activity, we found delinquency to have a linear relationship with some factors, but not others. Specifically, age of onset of sex and number of partners at age 19 followed a dose–response relationship. More serious delinquents began having sex at earlier ages and had more partners at age 19. General delinquency had an effect on sexual activity and contraception at age 19; delinquents were more likely than non-delinquents to have been sexually active during the past year and to report inconsistent or no use of contraception. Repeated serious delinquency and not general delinquency was associated with having sex more frequently at age 19. Thus, by late adolescence, repeat serious delinquents were having sex more frequently and with more partners, and contraceptive use was low. Even though many repeat serious delinquents had already caused a pregnancy, these patterns of sexual activity indicate that they continued to be at higher risk for fathering additional children. Overall, this study found the public health impact of repeated serious delinquency to be quite substantial.

The high rates of sexual activity and fatherhood among repeat serious delinquents are similar to those reported by studies of juveniles in correctional facilities. Morris et al. (1995) reported that 89% of male detainees were sexually active by age 14. Nesmith et al. (1997) found that 40% of incarcerated teenage fathers had caused multiple pregnancies. In another study of incarcerated youth, fatherhood had a significant relationship with recidivism, having had firearm injuries, and a history of current or prior STDs (McLaughlin et al., 1999), emphasizing that problems are indeed compounded in this very high-risk population.

The strengths of this study are based on data from a population-based, longitudinal study with high follow-up rates. Delinquency, age of onset of sexual activity and fatherhood status were ascertained prospectively over many repeated assessments, which minimized recall bias. A unique aspect of this study was its focus on repeat serious juvenile delinquents, who comprised about one-third of the participants.

This study had some limitations, which should be considered when interpreting the results. Because repeated serious delinquency and fatherhood were measured during overlapping time frames, their temporal relationship could not be established. Specifically, the timing of fatherhood in relation to the developmental course leading to repeated serious offending was not addressed. For example, it is not known when fatherhood occurred in relation to when

repeat serious delinquents committed their first minor offence, their first serious offence or the second serious offence, and so on. Regardless, this paper was intended to establish a concurrent relationship rather than a cause and effect relationship, as it is likely that delinquency and fatherhood are both influenced by other factors. In addition, since the definition of serious delinquency included sexual offences (i.e. rape/forced sex), there may be a problem of tautology, as the same act could have led to classification as a serious delinquent as well as the outcome (i.e. sexually active, impregnation or fatherhood).

The present study did not have information about the female partners of the males in this study. Thus, it is not known how many pregnancies were intentional. It also was not possible to assess the mother's role in the father's level of involvement with their child (e.g. whether she wanted him to be involved), whether the mothers also engaged in antisocial behaviour, or whether the father's delinquency had any effect on the mother's decision-making process regarding the outcome of the pregnancy. It is possible that racial differences in likelihood to terminate pregnancy contributed to the differing levels of association of delinquency with risk of impregnation and delinquency with risk of fatherhood between African-Americans and Caucasians, and this could not be addressed in this paper. In addition, the question of whether repeat serious delinquents were less involved with their children could not be adequately answered due to a loss in statistical power, as the three delinquency groups within the fathers had become rather small.

The costs of teenage fatherhood are extensive. According to a 1996 report by the Robin Hood Foundation, teenage childbearing costs US taxpayers almost \$7 billion every year. The cost to society in lost national productivity and avoidable expenditure of social service resources is as much as \$29 billion each year. The report found that teenage sons of adolescent mothers were up to 2.7 times more likely to land in prison than their counterparts in the comparison group. By extension, adolescent childbearing in and of itself costs taxpayers roughly \$1 billion each year to build and maintain prisons for the sons of young mothers (Robin Hood Foundation, 1996). These costs, which are based on teenage mothers, suggest that the costs and consequences of teenage fatherhood are similar or even greater, especially if one takes into account the robust association between repeated serious delinquency and teenage fatherhood.

The findings have important policy implications and implications for prevention and intervention services in urban settings. Because teenage fatherhood is more concentrated among repeat serious delinquents, reducing fatherhood in this population is likely to have a sizeable effect. Repeat serious delinquents comprise a crucial but hard-to-reach population for family planning services and education. Therefore, programmes and services for teenage pregnancy prevention need extra funding and efforts to address this population, in terms of both the primary prevention of pregnancy as well as the prevention of repeat pregnancies. These findings also stress the importance of

sexual education, family planning, and parenthood-training programmes aimed at inmate populations, given the increased representation of fathers in such populations. In addition, services are needed for young males who have a tendency to be violent toward their partners or children.

Nesmith et al. (1997) found that most incarcerated adolescent males perceived fathering a child as a teenager as desirable, and most felt they were capable of being good fathers, which shows the challenge for prevention in this population. Caddle (1993) has evaluated fatherhood-training courses in Young Offender Institutions with encouraging results; the courses increased young fathers' knowledge of child development and brought about positive changes in their attitudes to family relationships. Eddy et al. (2001) also evaluated inmate parenting programmes, and stressed their importance for preventing violence in the next generation. Nurse (2001) conducted a study of young incarcerated fathers, and reported that the structure of juvenile prison systems often hampers the juvenile offender's ability to play the role of father. Along with the findings from the present study, this body of research verifies the importance of providing education, resources and support for these young men to become responsible fathers. Evaluation studies are still needed to demonstrate that training programmes lead to actual changes in behaviour.

The present study suggests that intervention with repeat serious offenders is especially important for reducing the risk for future generations; the interpretation of the population attributable risk implies that if the causes of repeated serious delinquency were to be completely eliminated, 38% of teenage births in this sample might have been prevented. However, empirical studies are still needed which can demonstrate that reducing serious delinquency would in fact lead to reduction in teenage fatherhood. Although policy makers and service providers should be aware of the association between serious delinquency and teenage fatherhood, they should also be careful not to stereotype *all* teenage fathers as criminals.

More research is needed to address the aetiology of both serious delinquency and teenage fatherhood to better understand the extent to which teenage fatherhood and serious delinquency share the same underlying mechanism. In an earlier paper, Stouthamer-Loeber and Wei (1998) tested a wide range of risk factors and found that serious delinquency and teenage fatherhood shared many risk factors, such as coming from a disadvantaged neighbourhood or a single-parent home (Stouthamer-Loeber and Wei, 1998).

Longitudinal studies are needed to address the long-term consequences and costs of delinquency and early childbearing for repeat serious delinquents, their partners and their offspring. Future research can also identify situations where fatherhood serves as a life-course transition contributing to desistance or deceleration from offending. Using data from a historical cohort, Sampson and Laub (1993) found that incarcerated young men who developed and maintained bonds with their children had lower rates of recidivism. The association between repeated serious delinquency and teenage fatherhood can also

be elucidated in the context of male–female relationships, by gaining a better understanding of the roles of assortative mating.

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