

Unraveling Girls' Delinquency: Biological, Dispositional, and Contextual Contributions to Adolescent Misbehavior

Avshalom Caspi, Donald Lynam, Terrie E. Moffitt, and Phil A. Silva

We examined processes linking biological and behavioral changes in different contexts during adolescence by studying an unselected cohort of New Zealand girls from childhood through adolescence when they entered either mixed-sex or all-girl secondary schools. The impact of menarcheal timing on female delinquency was moderated by the sex composition of schools; early-maturing girls in mixed-sex settings were at greatest risk for delinquency. Individual differences in delinquency were also significantly more stable among girls in mixed-sex schools than among those in all-girl schools. These contextual variations are interpreted in terms of the differential distribution of reinforcements and opportunities for delinquency.

The life course is punctuated by numerous biological and social events that require individuals to organize their behavior around newly defined tasks. Puberty is among the most profound of these biosocial transitions. Thus, the onset of menarche in the adolescent girl not only signals her approaching reproductive capacity, but it also elicits new expectations from others, alters her reference group, and reorganizes her body image and sexual identity (Brooks-Gunn & Petersen, 1983; Koff, Rierdan, & Silverstone, 1978). Menarcheal onset is also associated with increases in the prevalence of norm-breaking behaviors and social deviance during the adolescent years (Stattin & Magnusson, 1990).

In an effort to contribute to our understanding of the etiology of female delinquency, this article examines the processes linking biological and behavioral changes in different contexts during adolescence. Our work represents an effort to integrate an ecological approach to the study of human development, sociological perspectives on delinquency causation, and recent advances in our understanding of the role of biological maturation in adolescent social behavior. Biosocial models of adolescence highlight the hormonal and social-stimulus effects of pu-

bertal changes on behavior (Petersen & Taylor, 1980; Udry, 1988). Sociological perspectives on delinquency causation focus our attention on the role of social norms in the initiation and maintenance of deviant behavior (Matza, 1969). And an ecological approach to human development alerts us to the possibility that developmental processes, not only behavioral outcomes, vary across different environmental settings (Bronfenbrenner, 1979).

Integrating these conceptual frameworks, this article reports a longitudinal analysis of juvenile delinquency in an unselected birth cohort of girls from New Zealand. There, we have followed a group of girls as they passed from childhood through adolescence and tracked their biological changes as they entered either mixed-sex or all-girl secondary schools. We examined whether and how processes linking biological and behavioral changes during adolescence (a) vary in different school contexts and (b) differ as a function of the behavioral predispositions of the developing girls.

Before turning to the longitudinal study, we briefly survey previous research on the timing of pubertal development and consider the role of school contexts in shaping the personal and social significance of biological changes in adolescence. We then elaborate our rationale for focusing on the sex composition of schools in our effort to unravel the roots of female delinquency.

Psychosocial Implications of Pubertal Timing

Differences in the timing of puberty have important implications for girls' development. In particular, previous research suggests that the menarcheal experience of early-maturing girls differs from that of later maturing girls (Brooks-Gunn, Petersen, & Eichorn, 1985; Grief & Ulman, 1982; Ruble & Brooks-Gunn, 1982). Especially noteworthy is the recent convergence of findings from three longitudinal studies conducted in three different countries. Simmons and Blyth (1987) found several problems among early-maturing girls in their American study, including body image disturbances, lower academic success, and conduct problems in school. Stattin and Magnusson (1990) reported more norm violations, as well as sexually precocious behavior, among early-maturing girls in Sweden. Caspi and

Avshalom Caspi, Donald Lynam, and Terrie E. Moffitt, Department of Psychology, University of Wisconsin—Madison; Phil A. Silva, Dunedin Multidisciplinary Health and Development Research Unit, Dunedin, New Zealand.

This work was supported by United States Public Health Service Grants MH-43746 and MH-45070 from the Antisocial and Violent Behavior Branch of the National Institute of Mental Health (NIMH) to Terrie E. Moffitt. Avshalom Caspi was supported by a grant from NIMH (MH-41827) and by a Spencer Fellowship from the National Academy of Education. The Dunedin Multidisciplinary Health and Development Research Unit is supported by the Medical Research Council and Health Research Council of New Zealand. We express our appreciation to the interviewers who collected the data and to the young New Zealanders who are members of the sample. Ericka Overgard edited the manuscript and designed the graphics. The comments of anonymous reviewers were very helpful to us.

Correspondence concerning this article should be addressed to Avshalom Caspi or Terrie E. Moffitt, Department of Psychology, 1202 West Johnson Street, University of Wisconsin, Madison, Wisconsin 53706.

Moffitt (1991) showed that the early onset of menarche was associated with disruptive psychosocial reactions among New Zealand teens.

Early maturation may have negative consequences for the adolescent girl because she risks negotiating the demands of her new status without the benefit of those social and institutional structures that support and smooth the way for later maturing girls. Moreover, precocious puberty may trigger an invidious nexus of social comparisons at a developmental period that is already characterized by heightened vulnerability. In addition, early-maturing girls may be vulnerable to peer pressures, because others attribute greater social maturity to them than is warranted by their chronological age (Eichorn, 1975). Whatever the explanation, early-maturing girls experience difficulties in adolescence. The early onset of menarche disrupts previously existing social equilibria and presents the adolescent girl with an ambiguous, novel, and uncertain event to which she must now respond.

Social Context of Pubertal Development

Responses to the social and biological changes of puberty depend on the social context in which they occur (Petersen & Taylor, 1980). Perhaps the most relevant context is school. Schools not only instruct but also provide youths with opportunities for social interaction. Indeed, what matters most about schools are their characteristics as cultural and social organizations, in particular, the values and norms to which they expose their pupils (Rutter, Maughan, Mortimore, & Ouston, 1979).

The cultural and social organization of schools may also shape girls' responses to puberty. Simmons and Blyth (1987) examined the transition to early adolescence among youths in two educational contexts: a K-6 and a K-8 elementary school. Girls who matured early and who began to date early suffered more self-image problems if their transition to seventh grade involved a shift from a K-6 elementary school into a junior high school than if they remained in a K-8 system. Simmons and Blyth suggested that the girls' vulnerability in seventh grade may stem from the social and sexual pressures exerted by older boys in their new peer culture.

A study of pubertal development among dancers and nondancers also revealed important contextual effects on behavior. Brooks-Gunn and Warren (1985; Gargiulo, Attie, Brooks-Gunn, & Warren, 1987) compared the psychological effects of on-time versus late physical maturation among girls enrolled in national ballet company schools with girls enrolled in non-dance private schools. There were few psychological effects attributable to differences in maturational timing among the nondancers. Among the dancers, however, on-time maturing girls experienced significantly more self-image disturbances than did later maturing girls. In combination, these studies suggest that contextual factors shape the personal and social significance of pubertal timing.

Pubertal Development and the Sex Composition of Schools

Although previous studies have not examined the implications of variable sex composition in the school environment for

girls' reactions to pubertal changes, we have reason to suppose that early-maturing girls in mixed-sex schools will encounter more difficulties than girls in single-sex schools. Part of the reason may have to do with the differential nature of social opportunities that operate in the two types of schools. In comparison with all-girl schools, the social composition of mixed-sex schools offers girls more opportunities to become involved in delinquent acts while, at the same time, subjecting them to a variety of social and sexual pressures from peers. Indeed, previous research has shown that delinquent behavior is more normative in schools with an equal mix of boys and girls than in all-girl schools (Rutter et al., 1979). After all, boys are much more likely than girls to engage in norm-breaking and delinquent activities (Hindelang, Hirschi, & Weis, 1981). In such settings, then, girls are more likely to encounter delinquent role models and to be reinforced by peers for participating in delinquent activities (Giordano, 1978). Differential association theory (Cressey, 1964) would thus lead us to predict that early-maturing girls in mixed-sex schools are more likely to engage in delinquency than girls in same-sex schools because opportunities for delinquent peer affiliations are differentially distributed across the two contexts. Moreover, once they begin to engage in delinquency, girls in mixed-sex schools may be more likely to persist in such behavior because there may be more social reinforcements for delinquency in mixed-sex schools than in all-girl schools.

The early-maturing girl in a mixed-sex school finds herself at the confluence of biological, psychological, and social changes. She is physically developed, psychologically immature, and socially vulnerable. Although the physically mature girl is more likely to be attractive to boys and to affiliate with older youths, it is not clear whether she possesses the requisite cognitive skills with which to confront situations that are likely to tax her ability to resist social pressures from peers (Eichorn, 1975). Indeed, research has shown that the relation between early maturation and a variety of "norm-breaking" behaviors is mediated by the tendency of early-maturing girls to associate with older peers (Stattin & Magnusson, 1990).

In addition to affiliating with older peers, the nature and context of children's friendships undergo important changes in the transition from preadolescence to adolescence. In preadolescence, the salient developmental task is achieving intimate relationships with youths of the same sex (Gottman & Mettetal, 1986). The onset of puberty adds pressures for achieving relationships with persons of the opposite sex. These pressures may be especially severe for early-maturing girls who are increasingly exposed to the predatory behavior of males. In his studies of adolescent sexuality, Udry (1988) found that androgenic hormones predicted sexual interest and noncoital sexual behaviors among girls, independent of levels of physical development, but the social-stimulus value associated with advanced physical development was required for the transition to sexual intercourse among girls, independent of their hormone levels (Udry, 1990). These results indicate that boys are responsive to the physical development of girls, and, along with other studies of peer influences on girls' delinquency (e.g., Giordano, 1978), suggest that early-maturing girls may encounter different opportunities, pressures, and reinforcements in mixed-sex schools than in single-sex schools.

In summary, we set out to study three related issues in this article. First, we examine whether the impact of menarcheal timing on female delinquency depends on the sex composition of the school environment. Second, we examine whether early-maturing girls, once initiated, will be significantly more likely to persist engaging in antisocial behavior if they are in mixed-sex schools than in all-girl schools. Third, we examine individual differences in processes that mediate the relation between menarcheal timing and delinquency.

Method

Subjects

Subjects were adolescent girls involved in the Dunedin (New Zealand) Multidisciplinary Health and Development Study. The cohort's history has been described by Silva (1990). Briefly, the study is a longitudinal investigation of the health, development, and behavior of a complete cohort of consecutive births between April 1, 1972, and March 31, 1973, in Dunedin, New Zealand. Perinatal data were obtained and, when the children were traced for follow-up at 3 years of age, 1,139 children were deemed eligible for inclusion in the longitudinal study by residence in the province. Of these, 1,037 (91%) were assessed. The children's fathers are representative of the social class distribution in the general population of similar age. Members of the sample are predominantly of European ancestry.

Girls constituted 501 of the 3-year-olds who were enrolled in the longitudinal study. Psychological, medical, and sociological measures were collected for 479 girls at age 5; 462 at age 7; 460 at age 9; 447 at age 11; 415 at age 13; and 474 at age 15. The present study required data about girls' schools. Three quarters of the girls participating at age 13 still lived in the province of Otago, and we were later able to obtain information about the gender composition of their schools. These 297 girls constituted the subjects described here. Comparisons between girls studied and those not studied are reported later in this section.

Measures

Menarche. Because of the practical difficulties in assessing body hair and breast growth in young girls, behavioral scientists have commonly used self-reports of menarche to measure pubertal development (Brooks-Gunn, Warren, Rosso, & Gargiulo, 1987). Age at menarche is an indicator of the more advanced stages of pubertal development; in most healthy girls, menarche follows 6 to 12 months after the height spurt and after breasts and pubic hair have developed to Tanner's fourth stage (Tanner, 1978).

We obtained self-reports of age at menarche from the girls when they were 15 years old. We were able to supplement missing menarche data for 13 girls by substituting their mothers' reports. Reliability and validity of these data have been reported elsewhere (Caspi & Moffitt, 1991; Moffitt, Caspi, Belsky, & Silva, 1992). The reported age at menarche (in months) ranged from 102 to 180 ($M = 155.28$, $SD = 12.12$, $Mdn = 156$, or 13.0 years of age).¹ This distribution is consistent with data reported by Tanner (1978) for seven western nations. For a portion of our analyses, girls were assigned by their age at menarche to one of three menarcheal groups: *early* (12 years and 5 months or younger; $n = 122$), *on time* (12 years and 6 months to 13 years and 6 months; $n = 173$), and *late* (13 years and 7 months or older; $n = 121$). The early and late groups constituted the extreme 30% tails of the distribution in menarcheal age.²

School context. New Zealand youths enter secondary schools at age 13. Of the 297 girls living in the province of Otago for whom we could secure information about school characteristics, 132 attended mixed-sex secondary schools and 165 attended all-girl secondary schools.

Any examination of the effects of secondary schools as developmental contexts requires that we also consider possible variations in school intake: Are there any systematic differences between students who enroll in mixed-sex and those who enroll in all-girl secondary schools that could jeopardize our ability to interpret our findings? We examined three critical variables: parental values, social class, and childhood behavior problems.

1. **Parental values:** It is possible that parents who enroll their daughters in all-girl secondary schools share a distinct value system. For example, if such parents profess religious beliefs, expect achievement, or exercise close supervision over their children, such values may serve to deter delinquency in their daughters. To evaluate this possibility, we turned to evidence from the Moos Family Environment Scales (Moos & Moos, 1981; Parnicky, Williams, & Silva, 1985), completed by the mothers of our subjects when the girls were 7 years old. This instrument comprises 10 subscales: Cohesion, Expressiveness, Conflict, Independence, Achievement Orientation, Intellectual-Cultural Orientation, Active-Recreational Orientation, Moral-Religious, Organization, and Control. Using two-tailed t tests, we compared the parents of girls in coed and girls' schools on all 10 family climate subscales. No differences were statistically significant ($p > .05$). We used multiple regression analysis to determine whether a linear combination of these values predicted school choice. It did not; parental values accounted for only 3% of the variance in school choice ($p > .2$).

Although these parental values were not systematically linked to school choice, New Zealand parents do give careful thought to the selection of a school for their children. According to a recent survey, the main reasons New Zealand parents gave for choosing their children's school were (a) the school's "reputation" (53% mentioned), (b) locality or closest to home (53% mentioned), and (c) that previous family members had attended the same school (33% mentioned), a reason perhaps unique to this tradition-conscious country (Silva, 1987).

2. **Social class:** The parents' occupations were rated on a 6-point scale that is used to assign social class in New Zealand (Elley & Irving, 1972). A comparison of girls attending mixed-sex versus all-girl secondary schools revealed a statistically significant difference between them in terms of their family socioeconomic status (SES; 3.14 vs. 3.49), $t(279) = 2.28$, $p < .05$; higher SES families were more likely to enroll their daughters in girls' schools. The SES will be controlled in subsequent analyses.

3. **Childhood behavior problems:** Because of our interest in juvenile delinquency in early and middle adolescence, it is especially critical to establish whether girls with behavior problems earlier in childhood were more likely to be enrolled in mixed-sex rather than all-girl secondary schools.

The Rutter Child Scale (RCS; Rutter, Tizard, & Whitmore, 1970) was filled out by parents and teachers when the girls were 9 years old. The 42 items inquired about antisocial, inattentive, impulsive, hyperactive, and anxious-withdrawn behavior and were rated as follows: 0 = *does not apply*, 1 = *applies somewhat*, and 2 = *certainly applies* (see McGee, Williams, & Silva, 1985). The RCS items regarding antisocial, inattentive, impulsive, and hyperactive behaviors were summed to provide a rating scale of "externalizing" behavior problems at age 9. We

¹ Nineteen girls had not yet menstruated by the age-15 assessment; their age of onset was thus coded as 16 years (192 months). All analyses described here were repeated excluding these 19 girls. Excluding them did not change the results in any way, so their data were used for this report.

² In an earlier report, we used a more extreme trichotomy: 20%-60%-20% (Caspi & Moffitt, 1991). Because the present report is limited to girls attending schools in the province of Otago, we have adopted a more liberal 30%-40%-30% split to increase our cell sizes. These designations are similar to those used by Simmons and Blyth (1987).

standardized and combined the parent and teacher ratings into a single score to improve the reliability and validity of this measure; multi-agent reports of behavior problems are more reliable than single-agent reports, and parents and teachers provide complementary information in their role as informants (Loeber, Green, Lahey, & Stouthamer-Loeber, 1990). A comparison of girls attending mixed-sex and all-girl secondary schools revealed no significant difference between them in terms of childhood behavior problems ($t < 1$).

Norm-breaking behaviors (age 13). The Self-Reported Early Delinquency instrument (SRED; described fully in Moffitt, 1989; Moffitt & Silva, 1988) was designed specifically for use in New Zealand. The SRED contains 29 items tapping norm-violating behaviors and 29 items tapping more serious illegal behaviors. The norm-violating scale, which is weighted for the seriousness of each item, was used in this study as the measure of norm breaking at age 13.³ It includes items such as stealing money from milk bottles, breaking windows, stealing from pupils at school, getting drunk, going to R-rated films, swearing loudly in public, and making prank telephone calls. One-month test-retest reliability ($r = .85$), internal consistency (Kuder Richardson Formula 20, $r = .90$), concurrent validity (with parental reports of antisocial behaviors, $r = .43$, $p < .001$), and criterion validity (with police records, $p < .01$) were good.

Self-reported delinquency (age 15). At age 15, only the 29-item scale of illegal behaviors from the SRED was administered to the girls. They were asked to report whether they had done each act "never," "once or twice," or "three or more times" during the past year. Items included behaviors such as shoplifting, automobile theft, breaking and entering, smoking marijuana, using harder drugs, buying alcohol, fighting, and using weapons. As at age 13, the items on this scale were weighted for seriousness, using New Zealand norms.

Familiarity with delinquent peers (age 13). This measure assesses familiarity with delinquent patterns of behavior among peers. Before reporting on their own delinquent behavior, the girls were first presented with items from the SRED and were asked, "Do your friends, or other kids your age that you know, do these things?" The girls sorted each of the 58 norm-violation and delinquent items into three piles: 0 = "I don't know anyone who has done this," 1 = "Only one or two kids do it," and 2 = "Lots of kids I know do it." Scores were summed to create an index of familiarity with peer delinquency. Although our measure relies entirely on the subjects for reports about their peers' delinquency, we believe that the girls' subjective perceptions of group norms about delinquent behavior are important for their own behavior.

The three measures of delinquency do not include any items that refer to sexual behavior. In New Zealand, minors cannot be asked about their sexual experiences for research purposes.

Procedure

The subjects were seen within approximately 1 month of their 9th, 13th, and 15th birthdays for a full day of testing at the Dunedin Multidisciplinary Health and Development Research Unit. The menarche and delinquency measures used in the present study (which was only one of several studies being conducted) were administered in the morning, in separate sessions that were counterbalanced in order and separated by 10-min breaks. Each interviewer was carefully trained and was unaware of the subjects' data on the other measures. The parent and teacher rating scales were mailed out before the laboratory assessments.

Are the Girls We Studied Representative of the Full Sample?

For this study, data were needed for menarche, school characteristics, social class, childhood behavior problems, and delinquency. Of

the 501 girls in the cohort, 416 had information about the onset of menarche, but only 297 had school data. Information about SES was missing for 14 girls; behavior ratings at age 9 were missing for 31 girls; and delinquency assessments at both ages 13 and 15 were missing for 82 and 6 girls, respectively. In sum, 265 girls had data on every measure.

Because most girls with missing data for one measure did have present data on the other measures, it was possible to test statistically for attrition effects. Multiple regression analysis was used to determine whether a linear combination of the central measures in this study was affected by girls' *present* versus *missing* status. Predictor variables were age at menarche in months, externalizing behaviors in late childhood, norm violations and peer delinquency at age 13, self-reported delinquency at age 15, school type, and social class. A pairwise correlation matrix of these variables was analyzed. The outcome variable was a dichotomous dummy variable representing the studied girls versus the remainder. Missing status accounted for 6% of the variance in study measures ($p < .05$). Externalizing disorders in late childhood contributed almost all of this R^2 ($\beta = .20$), indicating that girls with a childhood history of conduct difficulties were less likely to have all of the data needed to be included in our multivariate tests. This bias should have the practical effect of attenuating associations between childhood conduct problems and delinquency outcomes.

Results

The results are presented in three sections. First, we examine whether early-maturing girls in mixed-sex schools are at greatest risk for familiarity with delinquent peers and for involvement in delinquent behavior. Second, we examine whether early-maturing girls are more likely to persist engaging in antisocial behavior if they are in mixed-sex schools than in all-girl schools. Third, we examine the processes that mediate the association between menarcheal timing and delinquency among girls in mixed-sex schools.

Impact of Menarcheal Timing on Girls' Behavior in Different School Contexts

Familiarity with delinquent peers at age 13. Our analysis begins with an examination of the hypothesis that early-maturing girls in mixed-sex schools are more likely to be familiar with delinquent peers than are their counterparts in all-girl schools.

We carried out a 3 (time of menarche) \times 2 (school type) analysis of covariance (ANCOVA) using the summary index of familiarity with peer delinquency at age 13 as the outcome variable. The overall tests were followed by planned comparisons to test the effects of menarcheal timing in different school contexts. To facilitate interpretation of the outcomes, we introduced two covariates to our analyses: social class and externalizing behaviors in late childhood. Neither covariate was significantly associated with familiarity with delinquent peers, $F(1, 263) = 0.33$, ns , and $F(1, 263) = 0.99$, ns , respectively.⁴

³ The illegal scale was not used in this study because over half of the girls reported no illegal behaviors at age 13. The norm-violation and illegal behavior scales at age 13 were correlated .98.

⁴ The correlation between age-9 externalizing behaviors and age-13 norm violations was .14 ($p < .01$) among all girls who participated at age 13. This association is stronger than that observed in the subsample of girls analyzed here because, as we have already noted, girls with relatively extreme conduct problems were selectively missing the complete complement of age-13 data needed for our present analysis.

The group means from this preliminary analysis are shown in Figure 1. There was a significant main effect for time of menarche, $F(2, 263) = 3.15, p < .05$. The main effect for school type was statistically significant, $F(1, 263) = 6.73, p < .01$. The interaction effect was not significant, $F(2, 263) = 0.48, ns$.

This analysis should be regarded as preliminary, because the omnibus F tests did not address our focused questions; that is, it did not allow us to compare our specific predictions about the differential effects of menarcheal timing with the obtained data. To examine our hypothesis that the effects of early maturation on familiarity with delinquent peers were more pronounced in mixed-sex schools, we derived a set of predictions to be tested in a series of planned contrasts (see Rosenthal & Rosnow, 1985). Consistent with our prediction, early-maturing girls in mixed-sex settings had more familiarity with delinquent peers than did their early-maturing peers who were attending all-girl schools (19.23 vs. 14.17), $t(263) = 2.12, p < .05$. Between-school comparisons among the other two menarcheal groups yielded equivocal support for our predictions. At age 13, on-time maturers in mixed-sex settings had slightly more familiarity with delinquent peers than their counterparts in all-girl schools (16.79 vs. 13.77), $t(263) = 1.66, p < .10$, and late-maturing girls in mixed-sex settings did not differ from their all-girl school counterparts (13.60 vs. 12.00), $t < 1$. In summary, the results suggest that girls in mixed-sex schools were more familiar with delinquent peers than their counterparts in all-girl schools, and this difference was especially pronounced among early-maturing girls.

Norm-violating behaviors at age 13. Do early-maturing girls in mixed-sex schools also engage in more delinquent patterns of behavior? To explore this question, we repeated the aforementioned ANCOVA followed by planned comparisons to test the hypothesized effects by using the index of norm-violating behaviors at age 13 as the outcome variable. Once again, neither of the covariates was significantly associated with the outcome variable, $F(1, 262) = 0.85, ns$, and $F(1, 262) = 0.24, ns$, respectively.

The group means from this analysis are shown in Figure 2. The results revealed a significant main effect for time of menarche, $F(2, 262) = 4.63, p < .01$. The main effect for school type was not statistically significant, $F(1, 262) = 0.92, ns$.⁵ The interaction effect, which should be regarded as preliminary, was statistically significant, $F(2, 262) = 3.15, p < .05$.

To compare our predictions to the obtained data, we turned again to the set of planned contrasts. Consistent with our prediction, the results showed that early-maturing girls in mixed-sex schools engaged in significantly more norm-violating activities at age 13 than did their early-maturing counterparts in all-girl schools (4.25 vs. 2.08), $t(262) = 2.98, p < .01$. In addition, we carried out between-school comparisons separately for on-time and late-maturing girls. On-time maturing girls attending mixed-sex schools did not engage in significantly more norm-violating behaviors than their counterparts in all-girl schools (2.25 vs. 2.46), $t < 1$. Nor did late-maturing girls in mixed-sex schools differ in terms of delinquent activities from their counterparts in all-girl schools (1.26 vs. 1.36), $t < 1$. In summary, the results suggest that early-maturing girls were more likely to engage in norm-violating behaviors, and this effect was especially pronounced among early maturers in mixed-sex schools.

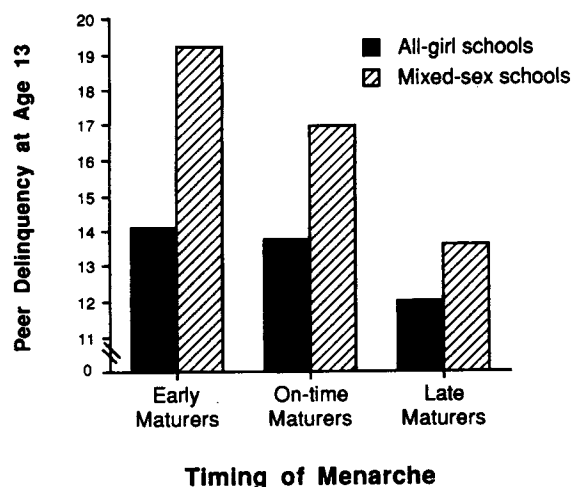


Figure 1. Familiarity with delinquent peers in early adolescence as a function of age at menarche and school type.

Self-reported delinquency at age 15. What about middle adolescence 2 years later? With biennial data, we can address several questions about the impact of pubertal development on girls' development across adolescence.

First, do the effects of early maturation persist or do they fade away by age 15? If the impact of early menarche on delinquency is merely immediate and short-lived, early-maturing girls might reduce their involvement in delinquent activities by the time they reach middle adolescence.

Second, do girls who begin menstruating in the intervening years catch-up with their early-maturing peers in delinquent behavior? If there is a catch-up effect by middle adolescence, girls who mature on time should not differ from their early-maturing counterparts in terms of delinquent behavior at age 15. However, we would still expect late-maturing girls to engage in significantly fewer delinquent activities than both their early- and on-time peers.

Finally, if there is a catch-up effect, is the impact of pubertal development on adolescent problem behavior confined to girls who attend mixed-sex schools? Our previous results, as well as differential association theory, suggest yes. At age 13, on-time maturers in mixed-sex schools were slightly more familiar with delinquent peers than on-time maturers in all-girl schools. It is thus likely that the incidence of "drift" into delinquency at age 15 will be more pronounced among girls in mixed-sex settings.

⁵ An observant colleague noted that our measure of peer delinquency is problematic because it measures *perceptions* of delinquent behavior among peers. It may be that perceptions reflect the respondents' own behavior rather than their peers' actual behavior. We do not believe, however, that our subjects' reports about peer delinquency are entirely projection. This interpretation is not consistent with our finding a significant effect of school type on reports of peer delinquency but no such effect on self-reports of norm violations; that is, although girls in mixed-sex schools did not report that they engage in more norm-violating behaviors, they did report more knowledge about delinquent patterns of peer behavior, a finding consistent with other research on the sex composition of schools (Rutter et al., 1979).

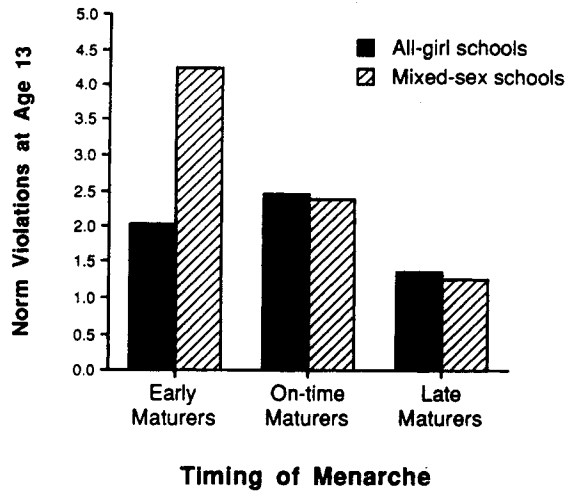


Figure 2. Norm violations in early adolescence as a function of age at menarche and school type.

To explore these questions, we carried out a 3×2 ANCOVA followed by planned comparisons to test the hypothesized effects by using self-reported illegal delinquency at age 15 as the outcome variable. Once again, we introduced social class and externalizing behaviors in late childhood as covariates into the analysis. Neither variable was significantly associated with illicit activities, $F(1, 261) = 0.05$, *ns*, and $F(1, 261) = 1.16$, *ns*, respectively.

The group means from this analysis are shown in Figure 3. The results revealed a significant main effect for time of menarche, $F(2, 261) = 3.81$, $p < .05$. As can be gleaned from Figure 3, early and on-time maturers did not differ from each other in terms of self-reported delinquency at age 15, but both groups differed significantly from later maturing girls. The main effect for school type was not significant, $F(1, 261) = 1.88$, *ns*. The interaction effect in this preliminary analysis was not significant, $F(2, 261) = 1.06$, *ns*.

As before, we used a set of planned contrasts to compare our specific predictions with the obtained data. The first prediction was supported: At age 15, just as they had at age 13, early-maturing girls in mixed-sex schools engaged in significantly more delinquent activities than did their counterparts in all-girl schools (3.16 vs. 1.78), $t(261) = 2.02$, $p < .05$. The second prediction received marginal support: At age 15, in contrast to the assessment 2 years earlier, on-time maturers in mixed-sex schools engaged in slightly more delinquent activities than their all-girl school counterparts (3.49 vs. 2.45), $t(261) = 1.78$, $p < .10$. The third prediction was confirmed: Late-maturing girls in mixed-sex schools did not differ significantly in terms of their self-reported delinquency from their counterparts in all-girl schools (1.26 vs. 1.51), $t < 1$.

In summary, the effect of early maturation did not simply fade away; early-developing girls engaged in antisocial behavior at least through age 15. In addition, they were joined by a new group of girls; at age 15, on-time maturers caught up with their biologically older predecessors. As at age 13, however, the effect of menarcheal timing at age 15 was moderated by school con-

text, and the impact of earlier menarche on delinquency continued to be pronounced among girls who were attending mixed-sex schools.

Thus far, we have treated the age-13 and age-15 data as distinct cross-sections. Left unaddressed is the connection between girls' behavior over time. Are those girls who engage in a variety of norm-breaking activities in early adolescence likely to engage in increasingly deviant activities in middle adolescence? We turn now to examine the persistence of delinquent behavior as it unfolds in different school settings.

Predictability and Stability of Female Delinquency

In the introduction we suggested that different environmental settings may play an important role in regulating behavioral consistencies among adolescents to the extent that these settings offer different opportunities and reinforcements for delinquent behavior. In a mixed-sex school setting, delinquent girls are likely to find reinforcements and opportunities for their activities. Thus, if the peer group serves as a convoy throughout development—providing guides for norm formation and the consolidation of behavior patterns over time (Cairns, Perrin, & Cairns, 1985)—we should find that individual differences in delinquent activities are very stable and predictable throughout adolescence among girls who attend mixed-sex schools. In contrast, delinquent girls in all-girl school settings are more likely to be viewed as deviant; deviant individuals are often disliked and are thus more likely to be coerced into more modal patterns—what Cattell (1982) has called “coercion to the biosocial mean” (p. 353). If this is the case, we should find relatively little individual-difference stability in the delinquent activities of girls attending same-sex schools.

To examine these issues, we estimated path analyses that model individual differences in delinquent activities separately by school type. The results are shown in Figure 4.

Consistent with the results presented earlier, the path analy-

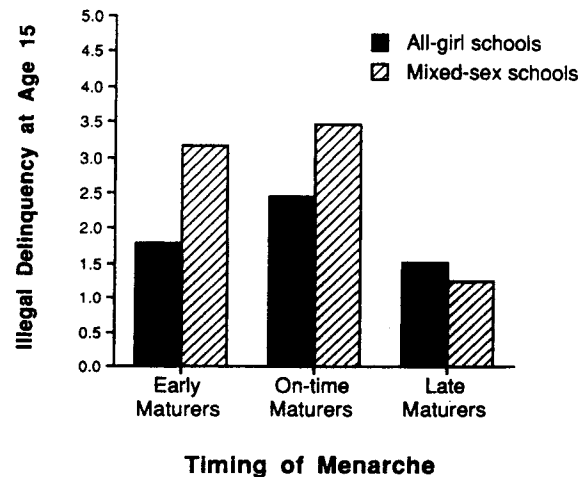


Figure 3. Self-reported delinquency in middle adolescence as a function of age at menarche and school type.

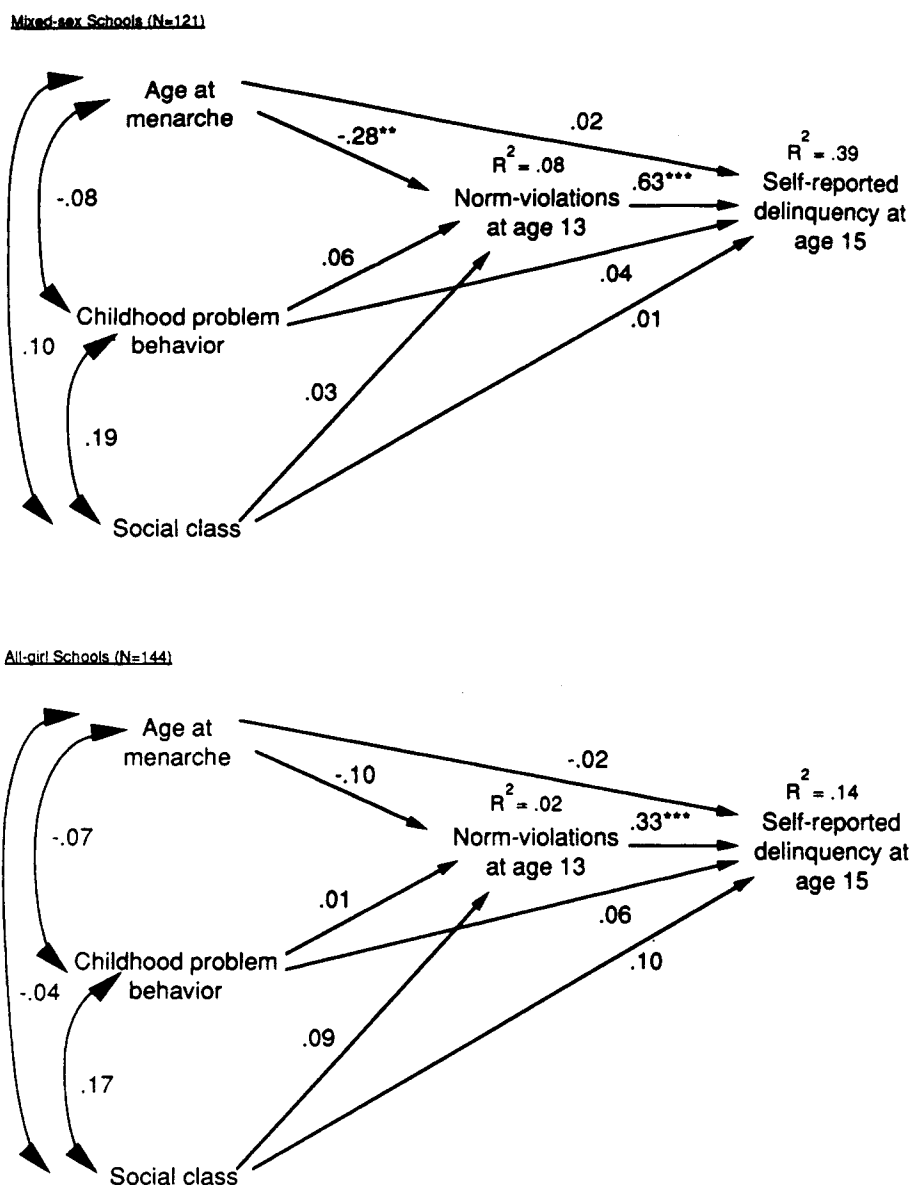


Figure 4. The predictability and stability of female delinquency in different school contexts. (* $p < .05$; ** $p < .01$; *** $p < .001$.)

sis revealed differences in the effects of menarcheal timing on norm-violating behaviors. Among girls in mixed-sex schools, there was a significant relation between the onset of menarche and norm-violating behaviors at age 13 ($\beta = -.28$, $p < .01$). Among students in all-girl schools, menarcheal timing had no significant effect on norm-violating behaviors ($\beta = -.10$, *ns*).

The results also showed that the delinquent behaviors of girls in mixed-sex schools were more stable across time than the delinquent behaviors of girls in same-sex schools. In mixed-sex schools, there was a strong tendency for girls who engaged in norm-violating behaviors at age 13 to progress to illicit activities at age 15 ($\beta = .63$, $p < .001$). The stability of individual differences was still significant, but considerably lower, among girls in same-sex schools ($\beta = .33$, $p < .001$). A *t* test for the difference

between the relation of norm-violating behavior at age 13 and illicit activities at age 15, based on a comparison of regression coefficients (Cohen & Cohen, 1975), showed that the stability and persistence of antisocial behavior was significantly greater among girls in mixed-sex schools, $t(261) = 4.09$, $p < .001$.

Toward an Understanding of Developmental Processes: A Role for Individual Differences

Thus far, our results have suggested that the effect of menarcheal timing on delinquent behavior is potentiated in mixed-sex school settings. In addition, individual differences in delinquent behavior are also more stable in mixed-sex schools. Although these findings have pointed to the importance of

familiarity with delinquent peers, the question remains: Does familiarity with delinquent peers mediate the relation between menarcheal timing and delinquency among girls in mixed-sex schools?

To address this question, we confined the following analysis to girls in mixed-sex schools because early maturation and norm violation were related only in this group of girls. In addition, we stratified the girls in mixed-sex schools into two groups on the basis of their childhood history of externalizing behavior problems. The first group of girls scored above the median on the age-9 parent and teacher ratings of externalizing problems. The second group scored below the median on these scales. We divided the girls into these two groups because developmental criminologists have pointed to two distinct groups of delinquents: those with an early history of behavior problems who tend to persist in their deviant behavior through adolescence to adulthood and those with a later onset who tend to desist at the end of adolescence (Farrington et al., 1990; Loeber & LeBlanc, 1990; Moffitt, 1990; White, Moffitt, Robins, Earls, & Silva, 1990). Recent research thus suggests that inquiries about the etiology of crime should attend to the childhood histories and attributes that distinguish between different adolescent offenders (Moffitt, 1992).

With childhood behavior histories in mind, we tested the hypothesis that familiarity with delinquent peers mediates the association between menarcheal timing and delinquent behavior. The results are shown in Figure 5.

The zero-order correlation between timing of menarche and norm violations was about the same for girls without ($r = -.23$) and with ($r = -.25$) a childhood history of externalizing problems. Although the correlation was of similar magnitude in both groups, the path analyses in Figure 5 suggest that the mediational process governing this association differed in each of the two groups.

1. Among girls without a childhood history of externalizing problems (Panel A), the effect of menarcheal timing on norm violations was *indirect*; the effect was almost entirely mediated by familiarity with delinquent peers. Early maturers were significantly more likely to know delinquent peers ($\beta = -.27$, $p < .05$); in turn, familiarity with delinquent peers was related to norm-violating behaviors ($\beta = .68$, $p < .001$). It appears that among girls without a previous history of behavior problems, the influence of menarcheal timing on juvenile delinquency was socially mediated by their familiarity with delinquent peers.

2. Among girls with a childhood history of externalizing problems (Panel B), the effects of menarcheal timing and peer delinquency on norm-breaking behaviors were *additive*; both exerted an independent influence on norm-violating behaviors (β s = $-.28$ and $.62$, respectively). The absence of an indirect effect of menarcheal timing through familiarity with delinquent peers is attributable, in part, to the fact that, among girls with a history of behavior problems, early menarche did not increase their likelihood of knowing delinquent peers beyond the risk already incurred from their externalizing behavior problems. Girls with a history of behavior problems were significantly more likely to know delinquent peers than girls without this childhood history (18.57 vs. 14.39), $t(127) = 2.16$, $p < .05$, but menarcheal timing within this subgroup was not associated

with knowing delinquent peers ($\beta = -.01$, *ns*). In short, girls with a history of childhood behavior problems were likely to know delinquent peers regardless of timing differences in menarche.

Discussion

The prevalence of offending and a variety of clinical disorders tend to increase during and after puberty (McGee et al., 1990; Moffitt, 1990). This epidemiological fact poses a unique challenge to life-course analysis: How are biological events and changing developmental contexts linked to behavioral changes in adolescence?

We tackled this question as part of our ongoing effort to understand the roots of delinquency. Specifically, we set out to study three related issues. First, we examined whether the impact of menarcheal timing on female delinquency depends on the sex composition of the school environment. Second, we examined whether early-maturing girls, once initiated, are significantly more likely to persist engaging in delinquent activities if they are in mixed-sex school settings. Third, we examined individual differences in the processes that mediate the relation between menarcheal timing and delinquency among adolescent girls.

Previous research has shown that early puberty is associated with behavior problems in girls, and this association has been observed in our sample as well. However, the present study shows that this association is confined to girls who were enrolled in mixed-sex educational settings. Early menarche did not seem especially troublesome for 13-year-olds who attended all-girl schools. When we observed our sample again 2 years later, the girls who had experienced menarche in the meantime had caught up with their early-maturing peers in terms of delinquency, but only if they too attended mixed-sex schools. Thus, the impact of menarcheal timing on female delinquency varied considerably across school contexts. The effects of menarcheal timing were most pronounced in mixed-sex settings, whereas they were nullified in same-sex schools. These contextual differences were not explained by differential selection into schools.

In addition, the results showed that, from early to middle adolescence, individual differences in delinquent behavior were significantly more stable among girls in mixed-sex schools than among girls in same-sex schools. Mixed-sex settings seemed to offer favorable conditions for the continuity of deviant behaviors, whereas the normative controls in same-sex settings may have suppressed these tendencies. More generally, it appears that deviant activities may need the support of the peer group not only for their initiation, but apparently for their maintenance as well. Collectively, these findings suggest that at least two factors are necessary for the initiation and maintenance of female delinquency: puberty and boys.

Puberty. Our emphasis on puberty differs fundamentally from earlier discussions of sexuality and female crime (e.g., Cowie, Cowie, & Slater, 1968; Konopka, 1966; Thomas, 1923). We believe that the onset of puberty operates as a releaser or sign stimulus to others in the social environment (e.g., male and

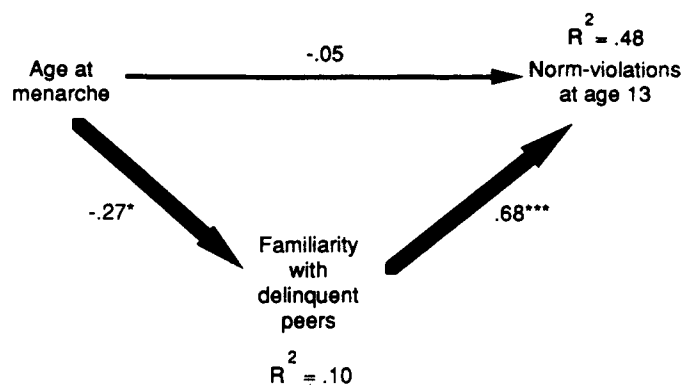
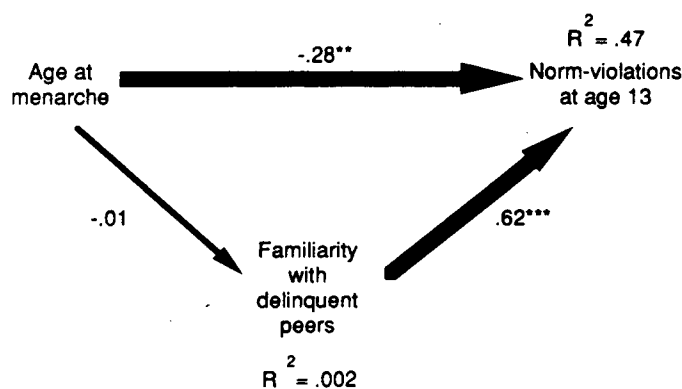
A. Girls without a childhood history of externalizing problems (N=66)B. Girls with a childhood history of externalizing problems (N=55)

Figure 5. Menarcheal timing, familiarity with delinquent peers, and norm-violating behaviors: Individual differences in developmental processes. (Social class was included as an exogenous variable in estimating these models. * $p < .05$; ** $p < .01$; *** $p < .001$.)

female peers as well as some adults).⁶ Puberty thus creates a “press” for new, adultlike ways of behaving among adolescent girls. These functions, however, may be complicated by the uncertain status of the adolescent in our age-graded society.

In olden times, biological maturity was attained at an older age while social status came at an earlier age. However, improved nutrition and health care have lowered the age of biological maturity while forces of modernization have increased the age at which adult status is ascribed to teens. The result is a 5- to 10-year period in which adolescents are biologically mature, yet they are asked to delay assuming adult responsibilities and privileges. Pubertal changes make the remoteness of social maturity painfully apparent to teens. They remain financially and socially dependent on their families of origin and are allowed few

decisions of real import. Yet, they want desperately to establish intimate bonds with the opposite sex, to make their own decisions, and to accrue their own material belongings, as adults do.

This emergent phenomenology of the pubertal girl coincides with her entry into a high school society dominated by older peers. From her perspective, older delinquents do not appear to

⁶ We have treated pubertal development only in terms of its social-stimulus value. It is also possible that the early onset of menarche may be accompanied by unique hormonal profiles that may have independent contributions to social behavior. Although we cannot disentangle social-stimulus effects from direct hormonal effects in our data, any explanation would have to contend with the modification of maturational effects in different school contexts.

suffer from the "maturity gap" (Moffitt, 1992). They are able to obtain possessions (e.g., cars, clothes, or drugs) by theft or vice that are otherwise inaccessible to teens who have no independent incomes; they are often free of their family of origin, and they seem to go their own way, making their own rules; and they seem more sexually experienced and self-confident with the opposite sex. In short, delinquency appears to offer an effective means of knifing off childhood apron strings, and older delinquent peers demonstrate the technique. Thus, delinquency is modeled for young girls by peers, and many of its consequences are powerfully reinforced, at least from a teen perspective. As a result, girls may begin to engage in a variety of norm-breaking behaviors in an adaptive effort to secure adult privileges (Jessor & Jessor, 1977; Silbereisen & Noack, 1988).

Boys. Importantly, the significance and implications of norm-breaking behaviors will be shaped by the social composition of developmental contexts such as schools. In particular, the present study suggests that the presence of boys in mixed-sex educational settings may serve to dilute school norms for tolerable conduct. Our findings showed that girls in mixed-sex schools were more familiar with delinquent peers and may have thus had more opportunities for participating in delinquent behavior. Indeed, the temporal sequence of our findings provides a clue about the process by which pubertal maturation may influence delinquent behavior.

1. Early-maturing girls in mixed-sex schools, in comparison with their peers in all-girl schools, had significantly more familiarity with delinquent peers at age 13 and had already, at age 13, engaged in significantly more antisocial activities than their peers in all-girl schools.

2. On-time maturing girls in mixed-sex schools, in comparison with their peers in all-girl schools, had slightly more familiarity with delinquent peers at age 13, but they had not yet themselves participated in significantly more antisocial activities than their peers in all-girl schools. However, by age 15, after the onset of menarche, these girls engaged in slightly more antisocial behavior than their peers in all-girl schools.

3. Late-maturing girls in mixed-sex schools, in comparison with their peers in all-girl schools, neither had more familiarity with delinquent peers nor engaged in significantly more antisocial activities than their peers in all-girl schools.

This pattern of results suggests that pubertal development first brings girls into contact with delinquent patterns of behavior, after which they may begin to sample from some of these activities. However, the last analysis in the present study suggested that to understand this process more thoroughly we must also consider the role of earlier predispositions in shaping contemporary behavior.

Familiarity with delinquent peers is often thought to produce delinquent behaviors through the principles of social learning (Cressey, 1964; Matza, 1969). Left unaddressed is the question, Where does the familiarity with delinquent peers come from? The answer appears to depend on the type of person. Individual girls differ widely in their predisposition to antisocial behavior, and our findings suggest that there are distinct pathways to delinquency among girls enrolled in coed schools.

For girls who had little predisposition to behave antisocially (as evidenced by a childhood with few or no behavior problems), early menarche worked its influence on delinquency

through the medium of peers. These girls' awareness of peer delinquency depended on their having attained menarche. And once they became aware of peer delinquency, they began to engage in it themselves. Physical maturation was thus their ticket of entry into the delinquent world of boys. In contrast, girls who had a record of behavior problems in childhood, long before the onset of menarche, were familiar with delinquent peers regardless of their menarcheal status. One possibility is that girls with a childhood history of externalizing problems, regardless of when they reach menarche, seek out peers who will reinforce their behaviors (cf. Caspi & Herbener, 1990; Kandel, 1978).

But why does early menarche exert such a powerful effect on the delinquent behavior of girls with this childhood history? One explanation draws on the hypothesis that dispositional effects on behavior are most pronounced when individuals experience profound discontinuities in their lives, especially during unpredictable and off-time transition events in the life course (Caspi & Bem, 1990; Caspi & Moffitt, in press). Thus, Caspi and Moffitt (in press) have proposed that salient individual differences are likely to be magnified and accentuated during periods of discontinuity as each individual, in an effort to regain control over the changing situation, attempts to assimilate discrepant events into existing cognitive and action structures. In short, a transition event that is characterized by ambiguity, novelty, and uncertainty (the early onset of menarche) is likely to accentuate the effects of preexisting attributes (behavior problems) on behavior (delinquency). Not surprisingly, then, girls with childhood behavior problems responded to the stress of early maturation by engaging in their most familiar pattern of behavior: antisocial behavior.

In summary, it appears that girls in our sample came to delinquency by means of two different pathways. This observation is consistent with other research showing that although there are multiple "causes" of delinquency, the processes that link these causes may differ across individuals. In fact, Moffitt (1990, 1992) has recently suggested that there are different subtypes of adolescent delinquents. The delinquent presentations of these subtypes are indistinguishable in adolescence (when delinquent behavior is at its demographic peak), making subtypes difficult to detect during adolescence. Theoretically, this uniform behavioral presentation conceals at least two distinct chains of etiological events that can only be identified by their unique developmental courses (Moffitt, 1990, 1992). Research that fails to acknowledge the possibility of different natural histories for different groups of delinquent individuals may overlook important findings about the origins of antisocial behavior.

In general, our study has benefited from an auspicious combination of factors. The design was prospective and longitudinal, the data included markers of biological age in a single age cohort, and the New Zealand setting allowed us to study adolescent development in mixed- versus single-sex school contexts. Each feature lends itself to a brief lesson for the study of delinquency.

1. Longitudinal designs are indispensable. Cross-sectional studies are not designed to discover developmental pathways. Our longitudinal design allowed us to discover that familiarity with delinquent peers had different implications for girls with different behavioral histories. In addition, we learned that con-

textual factors play an important role in the maintenance of delinquency over time, not just in its initiation. Longitudinal approaches are essential for social scientists seeking to understand the processes by which people become delinquent, persist, and desist.

2. Biological age may be more relevant for understanding (adolescent) crime than chronological age. The meaning of the relation between age and crime is of central concern to criminologists (Farrington, 1986; Hirschi & Gottfredson, 1983). However, the discussion has been limited to chronological age. Adolescence is a crucial developmental stage for criminology for two reasons: It is the age of onset of illegal behavior for most offenders, and the peak prevalence and incidence of property crimes occurs during the teen years. Although individual differences in biological age vary widely among adolescents of the same chronological age, these differences have been all but ignored by theoretical criminologists. In fact, chronological age is not necessarily the best scale for development, and our research suggests that biological age may matter more than chronological age for girls' delinquency. Magnusson (1988, p. 70) has thus suggested that "adding . . . biological age to the data space will improve explanations of variance in developmental data." The influence of biological maturation on boys' delinquency clearly merits parallel investigation.

3. Cross-national research can teach us about our own nation. American readers may question the relevance of a study of school contexts in New Zealand for youths in America. Few American students attend single-sex secondary schools, and those who do comprise a select group (e.g., expensive private schools or military academies). As we have seen, such selection factors are not very pronounced in New Zealand. As such, we view the New Zealand project as having offered a unique opportunity to capitalize on a "natural" experiment. Specifically, we have been able to examine how the impact of a universal biological event on behavior is controlled by the social context.

Conclusion

Research on crime and human nature has been fraught with disciplinary tensions, many of which stem from the unwarranted fear that "an emphasis upon the causative role of a biological-universal event [may serve] to downgrade the importance of other internal and contextual factors" (Cairns, personal communication, June 23, 1990; see also Denno, 1985; Wilson & Herrnstein, 1985). We trust that our study has allayed such fears, because, as we have shown, biological, dispositional, and contextual factors are all clearly implicated in the genesis of female delinquency. Indeed, adolescent social behavior represents a joint articulation of an evolutionary past and a social present, and its analysis can only proceed with insights gleaned from multiple disciplines.

References

- Bronfenbrenner, U. (1979). *The ecology of human development*. Cambridge, MA: Harvard University Press.
- Brooks-Gunn, J., & Petersen, A. C. (Eds.). (1983). *Girls at puberty: Biological and psychosocial perspectives*. New York: Plenum Press.
- Brooks-Gunn, J., Petersen, A. C., & Eichorn, E. (1985). The study of maturational timing effects in adolescence. *Journal of Youth and Adolescence*, 14, 149-189.
- Brooks-Gunn, J., & Warren, M. P. (1985). The effects of delayed menarche in different contexts: Dance and non-dance students. *Journal of Youth and Adolescence*, 14, 285-300.
- Brooks-Gunn, J., Warren, M. P., Rosso, J., & Gargiulo, J. (1987). Validity of self-report measures of girls' pubertal status. *Child Development*, 58, 829-841.
- Cairns, R. B., Perrin, J. E., & Cairns, B. D. (1985). Structure and social cognition in early adolescence: Affiliative patterns. *Journal of Early Adolescence*, 5, 339-355.
- Caspi, A., & Bem, D. J. (1990). Personality continuity and change across the life course. In L. Pervin (Ed.), *Handbook of personality theory and research* (pp. 549-575). New York: Guilford Press.
- Caspi, A., & Herbener, E. S. (1990). Continuity and change: Assortative marriage and the consistency of personality in adulthood. *Journal of Personality and Social Psychology*, 58, 250-258.
- Caspi, A., & Moffitt, T. E. (1991). Individual differences are accentuated during periods of social change: The sample case of girls at puberty. *Journal of Personality and Social Psychology*, 61, 157-168.
- Caspi, A., & Moffitt, T. E. (in press). When do individual differences matter? A paradoxical theory of personality coherence. *Psychological Inquiry*.
- Cattell, R. B. (1982). *The inheritance of personality and ability*. San Diego, CA: Academic Press.
- Cohen, J., & Cohen, P. (1975). *Applied multiple regression/correlation analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Cowie, J., Cowie, V., & Slater, E. (1968). *Delinquency in girls*. New York: Humanities Press.
- Cressey, D. R. (1964). *Delinquency, crime, and differential association*. Dordrecht, The Netherlands: Martinus Nijhoff.
- Denno, D. W. (1985). Sociological and human developmental explanations of crime: Conflict of consensus? *Criminology*, 23, 711-741.
- Eichorn, D. E. (1975). Asynchronizations in adolescent development. In S. Dragastin & G. H. Elder, Jr. (Eds.), *Adolescence in the life cycle: Psychological change and the social context* (pp. 80-95). New York: Wiley.
- Elley, W. B., & Irving, J. C. (1972). A socio-economic index for New Zealand based on levels of education and income from the 1966 Census. *New Zealand Journal of Educational Studies*, 7, 153-167.
- Farrington, D. (1986). Age and crime. In M. Tonry & N. Morris (Eds.), *Crime and justice: A review of research* (Vol. 7, pp. 189-250). Chicago: University of Chicago Press.
- Farrington, D., Loeber, R., Elliott, D. S., Hawkins, D. J., Kandel, D. B., Klein, M. W., McCord, J., Rowe, D., & Tremblay, R. (1990). Advancing knowledge about the onset of delinquency and crime. In B. Lahey & A. Kazdin (Eds.), *Advances in clinical child psychology* (Vol. 13, pp. 283-342). New York: Plenum Press.
- Gargiulo, J., Attie, I., Brooks-Gunn, J., & Warren, M. P. (1987). Girls' dating behavior as a function of social context and maturation. *Developmental Psychology*, 23, 730-737.
- Giordano, P. C. (1978). Girls, guys, and gangs: The changing social context of female delinquency. *Journal of Criminal Law and Criminology*, 69, 126-132.
- Gottman, J., & Mettetal, G. (1986). Speculations about social and affective development: Friendship and acquaintanceship through adolescence. In J. M. Gottman & J. G. Parker (Eds.), *Conversations of friends* (pp. 192-235). New York: Cambridge University Press.
- Grief, E. B., & Ulman, K. J. (1982). Psychological impact of menarche on early adolescent females: A review of the literature. *Child Development*, 53, 1413-1430.
- Hindelang, M. J., Hirschi, T., & Weis, J. G. (1981). *Measuring delinquency*. Beverly Hills, CA: Sage.

- Hirschi, T., & Gottfredson, M. (1983). Age and the explanation of crime. *American Journal of Sociology*, *89*, 552-584.
- Jessor, R., & Jessor, S. (1977). *Problem behavior and psychosocial development*. San Diego, CA: Academic Press.
- Kandel, D. B. (1978). Homophily, selection and socialization in adolescent friendships. *American Journal of Sociology*, *84*, 427-436.
- Koff, E., Rierdan, J., & Silverstone, E. (1978). Changes of representation of body image as a function of menarcheal status. *Developmental Psychology*, *14*, 635-642.
- Konopka, G. (1966). *The adolescent girl in conflict*. Englewood Cliffs, NJ: Prentice-Hall.
- Loeber, R., Green, S. B., Lahey, B. B., & Stouthamer-Loeber, M. (1990). Optimal informants on childhood disruptive behaviors. *Development and Psychopathology*, *1*, 317-337.
- Loeber, R., & LeBlanc, M. (1990). Toward a developmental criminology. In M. Tonry & N. Morris (Eds.), *Crime and justice* (Vol. 12, pp. 375-473). Chicago: University of Chicago Press.
- Magnusson, D. (1988). *Individual development from an interactional perspective*. Hillsdale, NJ: Erlbaum.
- Matza, D. (1969). *Becoming deviant*. Englewood Cliffs, NJ: Prentice-Hall.
- McGee, R., Feehan, M., Williams, S., Partridge, F., Silva, P., & Kelly, J. (1990). DSM-III disorders in adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry*, *29*, 611-619.
- McGee, R., Williams, S., & Silva, P. A. (1985). Factor structure and correlates of ratings of inattention, hyperactivity, and antisocial behavior in a large sample of 9-year-old children from the general population. *Journal of Consulting and Clinical Psychology*, *53*, 480-490.
- Moffitt, T. E. (1989). Accommodating self-report methods to a low-delinquency culture: A longitudinal study from New Zealand. In M. W. Klein (Ed.), *Cross-national research in self-reported crime and delinquency* (pp. 43-66). Norwell, MA: Kluwer Academic.
- Moffitt, T. E. (1990). Juvenile delinquency and attention deficit disorder: Boys' developmental trajectories from age 3 to age 15. *Child Development*, *61*, 893-910.
- Moffitt, T. E. (1992). *Adolescence-limited and life-course persistent antisocial behavior: A developmental taxonomy*. Unpublished manuscript, University of Wisconsin, Madison.
- Moffitt, T. E., Caspi, A., Belsky, J., & Silva, P. A. (1992). Childhood experience and the onset of menarche. *Child Development*, *63*, 47-58.
- Moffitt, T. E., & Silva, P. A. (1988). Self-reported delinquency: Results from an instrument for New Zealand. *Australian and New Zealand Journal of Criminology*, *21*, 227-240.
- Moos, R., & Moos, B. (1981). *Family environment scale manual*. Palo Alto, CA: Consulting Psychologists Press.
- Parnicky, J. J., Williams, S., & Silva, P. A. (1985). Family environment scale: A Dunedin (New Zealand) pilot study. *Australian Psychologist*, *20*, 195-204.
- Petersen, A. C., & Taylor, B. (1980). The biological approach to adolescence. In J. Adelson (Ed.), *Handbook of adolescent psychology* (pp. 117-155). New York: Wiley.
- Rosenthal, R., & Rosnow, R. L. (1985). *Contrast analysis: Focused comparison in the analysis of variance*. Cambridge, England: Cambridge University Press.
- Ruble, D. N., & Brooks-Gunn, J. (1982). The experience of menarche. *Child Development*, *53*, 1557-1566.
- Rutter, M., Maughan, B., Mortimore, P., & Ouston, J. (1979). *Fifteen thousand hours: Secondary schools and their effects on children*. Cambridge, MA: Harvard University Press.
- Rutter, M., Tizard, J., & Whitmore, K. (1970). *Education, health and behavior*. London: Longman.
- Silbereisen, R., & Noack, P. (1988). The constructive role of problem behaviors in adolescence. In N. Bolger, A. Caspi, G. Downey, & M. Moorehouse (Eds.), *Persons in context: Developmental processes* (pp. 152-180). New York: Cambridge University Press.
- Silva, P. A. (1987). *4,000 Otago teenagers: A preliminary report from the Pathways to Employment Project*. Dunedin Multidisciplinary Health and Development Research Unit, University of Otago Medical School, New Zealand.
- Silva, P. A. (1990). The Dunedin Multidisciplinary Health and Development Study: A 15-year longitudinal study. *Pediatric and Perinatal Epidemiology*, *4*, 96-127.
- Simmons, R. G., & Blyth, D. (1987). *Moving into adolescence: The impact of pubertal change and school context*. New York: Aldine De Gruyter.
- Stattin, H., & Magnusson, D. (1990). *Pubertal maturation in female development*. Hillsdale, NJ: Erlbaum.
- Tanner, J. M. (1978). *Fetus into man*. Cambridge, MA: Harvard University Press.
- Thomas, W. I. (1923). *The unadjusted girl*. Boston: Little, Brown.
- Udry, J. R. (1988). Biological predispositions and social control in adolescent sexual behavior. *American Sociological Review*, *53*, 709-722.
- Udry, J. R. (1990). Hormonal and social determinants of adolescent sexual initiation. In J. Bancroft (Ed.), *Adolescence and puberty: The 3rd Kinsey Symposium* (pp. 70-87). New York: Oxford University Press.
- White, J., Moffitt, T. E., Robins, L., Earls, F., & Silva, P. A. (1990). How early can we tell? Preschool predictors of boys' conduct disorder and delinquency. *Criminology*, *28*, 323-350.
- Wilson, J. Q., & Herrnstein, R. J. (1985). *Crime and human nature*. New York: Simon & Schuster.

Received July 2, 1991

Revision received October 23, 1991

Accepted April 2, 1992 ■