Research Article

Are Juvenile Offenders Extreme Future Discounters?

Margo Wilson and Martin Daly

McMaster University, Hamilton, Ontario, Canada

ABSTRACT—*It has been the prevailing view that young offenders are more present oriented than their peers, but this view has little empirical basis other than the actions that have defined these youth as offenders. In the present study, we used a decision task with actual monetary consequences to assess the tendency of young offenders and a control group of high school students to discount the future. The young offenders were not significantly different from the students in discounting the future, even though the young offenders scored significantly higher on a sensation-seeking personality scale, were less likely to have lived with their fathers, and had changed schools more often. Young offenders and control participants were also similar in the extent to which they manifested a clear vision of the future by anticipating which future milestones would occur sooner, in a task pairing milestones with each other and with year markers.*

Why do some young people commit criminal acts and others refrain? One popular answer is that delinquents are more present oriented and less mindful of future consequences than their law-abiding peers. Delinquents have been described as impulsive, impatient, lacking in self-control, and incapable of delaying gratification (e.g., Gottfredson & Hirschi, 1990; Lynam et al., 2000; Pratt & Cullen, 2000; Pratt, Turner, & Piquero, 2004; Stylianou, 2002; Tittle, Ward, & Grasmick, 2004; Vazsonyi, Pickering, Junger, & Hessing, 2001; White et al., 1994; Wright, Caspi, Moffitt, & Paternoster, 2004), characterizations that imply a maladaptive emphasis on immediate rewards at the expense of long-term planning. J.Q. Wilson and Herrnstein (1985) have especially emphasized the temporal dimension of criminal impulsivity, arguing that offenders have "short time horizons," discounting the value of the future at a higher rate than other people, and that individual differences in this trait are partly constitutional and partly the result of different reinforcement histories. Arguably, however, the evidence that juvenile offenders are excessively present oriented resides primarily in their impulsive and criminal acts, rather than in any independent assay of time preference.

Kirby and Maraković's (1996) method for quantifying future discounting has become popular: Subjects are offered a series of paired choices between a smaller sum of money to be delivered after a shorter interval (usually "today") and a larger sum to be delivered after a longer interval. The various pairs represent a range of implicit interest rates at which the payoff will increase if deferred; this variation is typically scaled as a hyperbolic discount parameter, k (see Kirby & Santiesteban, 2003). Sometimes the monetary options are hypothetical, and sometimes they are real, but in either case, most subjects make fairly consistent choices, picking smaller, earlier rewards below some personal threshold value of k and larger, later ones above that threshold. Using this method, researchers have verified some predictable between-groups differences. Men tend to discount the future more than women (Daly & Wilson, 2005; Kirby & Maraković, 1996), for example, and heroin addicts, alcoholics, and smokers (including young teens who smoke) discount more than matched control participants (Audrain-McGovern et al., 2004; Bickel, Odum, & Madden, 1999; Kirby, Petry, & Bickel, 1999; Kollins, 2003); in heroin addicts, discounting increases with delay since the last fix (Giordano et al., 2002).

Kirby and Maraković's (1996) method has face validity as an assay of J.Q. Wilson and Herrnstein's (1985) time-horizon construct, and the research results just summarized are consistent with the notion that it indexes impulsive disregard for the long term. Moreover, Kirby et al. (1999) have shown that discounting measured in this way is correlated with standard self-report measures of impulsivity. To the best of our knowledge, however, no one has yet assessed whether juvenile offenders differ from their peers in performance on this task. Such a comparison was one goal of the research reported here.

Another possible implication of the proposition that delinquents are excessively present oriented is that they lack clear mental models of the future. To assess this possibility, we

Address correspondence to Margo Wilson, Department of Psychology, McMaster University, Hamilton, Ontario, Canada L8S 4K1, e-mail: wilson@mcmaster.ca.

borrowed a method from Link, Brown, and King (1996), presenting subjects with pairs of future milestones and asking them to indicate which they expected to happen first. Paired-comparison judgments are easier to make than exact estimates when the judgments are not well practiced, and because responses can and often do produce intransitive triads (A before B, B before C, but C before A), each individual's responses yield a measure of consistency, which should be greater the clearer the individual's vision of the future. By incorporating some dates into the choice pairs, we were also able to estimate the time frame in which respondents expected various life events to occur without asking for direct estimates, and to compare these expectations between groups. Such comparisons are of potential interest because people in relatively poor circumstances may have relatively compressed life courses, with realistic expectations of early reproduction, early deaths of relatives, and so forth (Geronimus, 1996; M. Wilson & Daly, 1997).

A further implication of the idea that juvenile offenders have short time horizons is that they are relatively undeterred by threats to their future well-being, preferring the pleasures of the moment. Some prior research indicates that young offenders may indeed be distinguished from their peers by higher levels of sensation seeking and risk taking, and so we administered Zuckerman's (1994) Sensation-Seeking Scale, a self-report personality test that includes various items assessing the respondent's attraction to dangerous recreational activities, intoxicants, unsafe sex, and unpredictable situations, in order to see whether such a difference held between our offender and control groups, and to assess whether sensation seeking and future discounting were correlated within groups.

METHOD

Subjects

Two groups of subjects were recruited for this research: 91 young offenders and 284 high school students (the control group). Both were recruited by advertising the opportunity to participate in a study of "Choices and Chances" in which one would answer questions and make choices on a computer, and would "have a chance to win some money." Participation was conditional on the written consent of both the subject and one parent.

The offender group consisted of 73 males (mean age = 15.8 ± 1.4, range: 13–19) and 18 females (mean age = 14.8 ± 1.2, range: 12–17), all of whom either had been convicted of a crime serious enough to merit incarceration or were in detention awaiting court proceedings on such charges. About half of the offenders had been incarcerated more than once. About 80% had been detained for property crimes, threatening, or common assault, and the rest for more serious violent crimes. All were under court-ordered supervision at the time of testing, either in 24-hr custody (n = 61) or in a noncustodial program for youth on probation (n = 30), and were recruited as research volunteers through these programs.

The high school students consisted of 165 males (mean age = 16.0 ± 1.4, range: 14–20) and 119 females (mean age = 16.2 ± 1.6, range: 13–20), recruited from three Hamilton, Ontario, high schools. The schools were selected because they had been attended by a high proportion (29%) of the young offenders at the time of their apprehension. School participants were recruited by means of notices posted on bulletin boards and public address announcements to the entire school.

Procedure

Subjects were tested in a quiet room, without visual or verbal contact with their peers. The sequence of tasks was briefly explained verbally, as were the procedures that would determine payoffs, and subjects were invited to ask questions. Each was then seated before a laptop computer, on which all questions were presented and all data were collected. Subjects were given the option of hearing a simultaneous audio presentation of screen text through earphones; 56% of offenders and 32% of students chose to do so.

After introductory screens, the discounting and milestones tasks (see Measures) were presented first, in an order randomized for each subject, followed by the Sensation-Seeking Scale. Finally, subjects were asked a number of demographic and other autobiographical questions, including questions about their age and sex; the numbers of older and younger brothers and sisters they had; the numbers of years they had lived with their mother, father, stepmother, stepfather, foster parent or group home, and other relative; the number of years they had lived on their own; the number of schools they had attended; and their recreational activities. They were also asked, "If you needed money who would you go to?" (options were mother, father, brother, sister, friend, grandparent, girl- or boyfriend, teacher, and "other").

Measures

Discounting

For the discounting task, subjects responded to 18 successive computer screens, each of which contained one choice of the following form:

Which would you rather have?

$x tomorrow or $y, z days from now

The lesser sum, $x, ranged from $20 to $80; the greater sum, $y, ranged from $50 to $85; and the delay, z, ranged from 7 to 162 days. The experimenter explained that one of the subject's choices might actually be paid off (as described later in this section) and added, "In order to get the prize you want, pick each time like you will actually get the money." Subjects were obliged to click on each preferred option before the program would advance to the next screen.

Previous research has shown that people discount smaller sums more than larger ones (i.e., demand a higher interest rate for waiting). Kirby and Maraković (1996) showed this using "small" ($25, $30, $35), "medium" ($50, $55, $60), and "large" ($75, $80, $85) delayed payoffs, and we used their 18 choice pairs with medium or large delayed payoffs in the present study. In most prior research, the lesser reward has been made available "today," but we used "tomorrow" to avoid confounding delay with transaction costs (the necessity of doing something extra to collect the delayed sum) and with possible distrust regarding whether delayed payoffs would indeed be forthcoming after the experimenter departed (see M. Wilson & Daly, 2004). Choices on the choice pairs with medium and large sums were used to compute two hyperbolic discounting parameters for each subject, following the method of Kirby and Maraković (1996); we also followed them in using the natural log transform of these k values for parametric statistical analyses.

After making these choices, participants were invited to roll two standard dice, and anyone who threw double 1s or double 6s (a 1-in-18 chance) received the face value of his or her choice on one randomly drawn pair. These cash payoffs were deposited with the program directors or school vice principals, and became available to the winning subjects after the specified delay (i.e., 1 to 162 days).

Future Milestones

This task was introduced as follows: "Milestones are special events in our lives. Some milestones are good, and some milestones are not good. Milestones can be different for different people. They can also happen at different times." Subjects were then invited to consider seven milestones (owning one's first car, graduating from high school, starting full-time employment, the birth of one's first child, first living on one's own, first sexual intercourse, and marrying or establishing a common-law relationship), and to indicate whether each had happened already, would never happen, or might happen. Each milestone that a subject indicated had not yet happened but might happen was then paired with every other such milestone, as well as with each of five future calendar years (1, 2, 5, 10, and 15 years in the future), and these pairs were presented one by one, in random order, with the following instruction: "For the following choices, please pick what you think will happen to you first." Thus, a maximum of 56 paired comparisons was presented (i.e., to those subjects who indicated that all seven milestones might happen).

One measure computed from these data was a subject-specific index (z) of consistency or transitivity (Peterson & Brown, 1998), ranging from 1.0 (perfect transitivity, i.e., no circular triads) to 0 (if circular triads were as numerous as logically possible). We also used these data to examine whether the offender and student groups differed in whether they had already experienced certain milestones or in when they expected them to occur.

Sensation Seeking

The 40 items of Zuckerman's (1994) Sensation-Seeking Scale, Version 5, were presented to subjects as 40 consecutive computer screens. For each item, subjects picked the statement that "best describes you" from a pair of more or less antithetical statements about desires, preferences, and anticipated reactions to certain experiences (e.g., "I would like to try parachute jumping" vs. "I would never want to try jumping out of a plane, with or without a parachute"). A few items were modified slightly to make them more appropriate for these adolescent subjects.

RESULTS

Attributes of the Offender and Student Groups

We compared the offenders and students to look for group differences with respect to demographic and circumstantial variables (in addition to the differences in age and sex composition; see the Subjects section). They did not differ in numbers of siblings (offenders: $M = 2.8 \pm 2.1$; students: $M = 2.5 \pm 2.1$), but the offenders were more likely to be middle-borns (i.e., to have both older and younger siblings) than the school participants (49% vs. 34%), $\chi^2(1, N = 373) = 6.95$, $p_{rep} = .96$, Cramer's $V = .14$; this result replicated a recent finding by Bègue and Roche (2005), who attributed the overrepresentation of middle-borns among juvenile offenders to reduced parental supervision.

The groups did not differ significantly in the proportion of their lives during which they had resided with their mothers (offenders: $M = 0.91 \pm 0.16$, students: $M = 0.93 \pm 0.21$), but the offenders had spent a smaller proportion of their lives residing with their fathers ($M = 0.46 \pm 0.41$) than had the students ($M = 0.69 \pm 0.39$), $F(1, 347) = 21.6$, $p_{rep} > .99$, $d = 0.57$, and were significantly more likely to have spent some time in a foster family (offenders: 29%, students: 7%), $\chi^2(1, N = 343) = 27.6$, $p_{rep} = .99$, Cramer's $V = .28$. They were also less likely than the students to say they would go to a relative for money (82% vs. 91%), $\chi^2(1, N = 362) = 5.05$, $p_{rep} = .92$, Cramer's $V = .12$, which probably reflects their past and present residential circumstances. Finally, the offenders had attended more schools ($M = 5.5 \pm 3.1$) than the students ($M = 4.4 \pm 2.3$), $F(1, 359) = 11.8$, $p_{rep} = .99$, $d = 0.43$; the minimum would ordinarily be three (elementary, middle, and high school).

Discounting

Data for 5 young offenders were lost because of computer error. For an additional 8 offenders and 17 students, one or both hyperbolic discounting parameters could not be computed because choices implied a parameter outside the range of the choice set. Mean discounting parameters for the remaining 345 subjects are portrayed in Table 1. Contrary to the hypothesis that offenders are extreme discounters, their average k parameter was lower than that of the students, although not significantly so;

TABLE 1

Mean Value of the Hyperbolic Discounting Parameter k *as a Function of Gender and Group*

	Group		
Gender	Offenders	Students	Total
Male	0.0315 ± 0.044 (64)	0.0412 ± 0.057 (154)	0.0384 ±0.053 (218)
Female	0.0385 ± 0.061 (14)	0.0312 ± 0.044 (113)	0.0320 ± 0.046 (127)
Total	0.0327 ± 0.044 (78)	0.0370 ± 0.052 (267)	0.0360 ± 0.051 (345)

Note. The *n* for each cell is given in parentheses.

there was also no significant effect of sex, nor was there a group-by-sex interaction.

The absence of group differences might, in principle, be attributable to noisy data, as a result of subjects failing to understand the task or to take it seriously, but two additional findings speak against this interpretation. First, there were highly significant differences between the k parameters for the medium versus larger sums, replicating results with undergraduates (Kirby & Maraković 1996; M. Wilson & Daly, 1998): for the high school students, mean k was 0.0413 for medium ($50, $55, $60) sums and 0.0266 for large ($75, $80, $85) sums, $t(243) = 4.29$, $p_{rep} > .99$, $d = 0.27$, and for the offenders, the respective values were 0.0394 and 0.0214, $t(73) = 2.36$, $p_{rep} = .93$, $d = 0.27$. Second, choices were highly consistent: A majority of both the offenders and the students exhibited perfect consistency (i.e., made no choices contrary to their personal medium-payoff and large-payoff k estimates). Overall, the offenders exhibited 97.2% consistency, and the students 97.6%, only slightly less than the 98.5% consistency that Kirby and Maraković (1996) reported for Williams College students (who had the advantage of being able to examine all choice pairs on a single piece of paper, unlike the present subjects, who made their choices singly).

In order to include responses of the 25 subjects whose overall k parameters were out of range, we also analyzed simple counts of the number of times subjects chose the smaller, sooner-received sum. Results were unchanged; that is, the only significant effect was that medium sums were discounted more than larger sums.

Future Milestones

Seventy-four offenders and 280 students provided paired-comparison data ("which will happen to you first?") for at least three of the seven milestones in relation to each other and to five calendar years, and we computed consistency scores (see the Method section) for these 354 respondents. Contrary to the hypothesis that offenders have especially vague or imprecise notions of the future, the offenders were slightly more consistent ($z = .80 \pm .24$) than the students ($z = .78 \pm .20$), albeit not significantly so. Milestones that had already been attained were not included in these paired comparisons, but although the offenders were more likely than the students to have reached one milestone, namely, first sex (see the next paragraph), the average numbers of paired comparisons made by participants in the two groups were very similar (42.8 ± 10.6 for the offenders, 44.8 ± 10.8 for the students).

First sexual intercourse was the only milestone for which the experience of the two groups differed significantly: 62% of the offenders and 44% of the students indicated that they had already had this experience, $\chi^2(1, N = 352) = 6.66$, $p_{rep} = .95$, Cramer's $V = .14$, even though the offenders were, on average, slightly younger. For each of the other milestones, no more than 12% of participants in either group reported having already attained it.

In general, the offenders did not appear to have a more compressed view of their futures than the students, although their specific expectations differed. For example, the offenders were slightly more likely than the students to say they expected to marry or cohabit within the next 5 years (64.5% vs. 52.5%), but were slightly less likely to predict that this would happen within 10 years (67.1% vs. 76.1%); neither difference was significant. However, the offenders expected to have children sooner: 30.9% of offenders and 16.7% of students within the next 5 years, $\chi^2(1, N = 277) = 6.4$, $p_{rep} = .95$, Cramer's $V = .15$, and 63.6% of offenders and 45.9% of students within 10 years, $\chi^2(1, N = 275) = 6.3$, $p_{rep} = .95$, Cramer's $V = .15$. Conversely, the offenders thought themselves less likely to graduate from high school within the next 5 years (offenders: 73.8%, students 89.8%), $\chi^2(1, N = 348) = 13.6$, $p_{rep} > .99$, Cramer's $V = .19$, or 10 years (84.8% vs. 90.8%, respectively), $\chi^2(1, N = 348) = 2.4$, $p_{rep} = .79$, Cramer's $V = .08$; in this, the offenders were presumably accurate.

Sensation Seeking

Table 2 presents the groups' scores on the Sensation-Seeking Scale. Offenders scored higher than students, $F(1, 365) = 10.4$, $p_{rep} = .99$, $d = 0.46$, and males scored higher than females, $F(1, 365) = 5.3$, $p_{rep} = .93$, $d = 0.54$. The sex difference appears to have been larger among the students than among the offenders, and indeed was significant only within the former group, but

TABLE 2

Mean Score on Zuckerman's (1994) Sensation-Seeking Scale as a Function of Gender and Group

	Group	
Gender	Offenders	Students
Male	23.9 ± 4.8 (71)	22.4 ± 5.9 (162)
Female	23.2 ± 5.2 (16)	19.1 ± 6.4 (120)

Note. The *n* for each cell is given in parentheses. The maximum possible score on this scale is 40.

there was no significant sex-by-sample interaction. Both main effects replicate prior findings (Zuckerman, 1994).

There was no significant correlation between sensation seeking and discounting within any of the four sex-by-status groups: male offenders, $r = -.16$ ($n = 60$); female offenders, $r = .18$ ($n = 12$); male students, $r = .11$ ($n = 147$); female students, $r = -.01$ ($n = 113$).

DISCUSSION

In this study, young offenders did not discount delayed monetary rewards more than did students in the control group, contrary to what might be expected on the basis of a large literature characterizing young offenders as shortsighted. This result cannot be attributed to their misunderstanding the task or failing to take it seriously, because choices were highly consistent with inferred individual switching thresholds, and because both groups discounted smaller sums significantly more than larger ones, as expected. Moreover, the young offenders were no less consistent than the students in their choices of which future milestones would occur before others (and indeed were slightly more consistent), which suggests that their models of the future are no more vague than those of other adolescents.

These results cannot be explained away by suggesting that the two groups were generally alike. As in previous studies (see Zuckerman, 1994, for a review), the offenders scored higher on sensation seeking than the students, and they also were more likely to have lived in foster homes, had changed schools more frequently, had resided with their fathers less, and were more likely to be middle-borns.

Both groups of adolescents discounted the future much more steeply than first-year university undergraduates in the same city. The discount parameter k averaged 0.036 for the subjects in this study (Table 1), whereas that of university undergraduates making the same monetary choices was 0.016 in one study (M. Wilson & Daly, 2004) and 0.017 for another group of 320 undergraduates (M. Wilson & Daly, 1998). Of course, undergraduates are a select group of youths differing from the samples in the present study in many respects other than age, but a growing body of literature indicates that age could itself be crucial, as areas of the cortex that are implicated in decision making and behavioral inhibition continue to develop during adolescence (e.g., Fuster, 2002; Luna & Seeney, 2004), a life stage in which risk taking and disdain for the future are common (e.g., Moffitt, 1993).

Our results call into question the assumption that a construct such as a personal discount rate or time horizon corresponds to a unified psychological entity affecting the gamut of intertemporal choices (see also Fellows & Farah, 2005; Frederick, Loewenstein, & O'Donoghue, 2002). For example, "impulsive" choices may often reflect responses to immediacy that do not affect choices between more distal alternative futures; such responses were obviated in our study by delaying the more immediate payoff option until "tomorrow." Both the lack of differences in discounting between the offenders and the students and the absence of correlation between sensation seeking and monetary discounting suggest that diverse actions that seem intuitively to entail disdain for the future may have little or no commonality of causation. Variable willingness to take dangerous risks may sometimes be caused by variability in attitudes toward the future (e.g., Robbins & Bryan, 2004), but it may also result from variability in estimation of the risks or in the value attached to a potential reward, among other possibilities. Risk taking and impatience are normal adaptive responses that one might expect to be facultatively adjusted in relation to cues of their utility given the individual's sex, age, and life circumstances; pathology is revealed by failures of appropriate facultative adjustments. At a theoretical level, it is appropriate to seek to understand these phenomena and their life-course development in terms of trade-offs between the near and long term (Daly & Wilson, 2005), but a unitary process of time preference is not necessarily a psychological reality.

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