Self-Control and Variability Over Time: Multivariate Results Using a 5-Year, Multisite Panel of Youths

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Gottfredson and Hirschi claimed, as part of their general theory of crime, that a child's criminal propensity, what they called level of self-control, is fairly fixed by age 10. Low self-control children, they further claimed, exhibit greater proclivities for delinquency and analogous behaviors than children with high levels of self-control. They see self-control levels for children at both ends of the spectrum—and their propensities for crime and analogous behaviors—as immutable over the life course. The authors explore the self-control levels, self-reported illegal behavior, and supporting attitudes exhibited by a panel of youths from in six cities at five points in time. Some of our findings substantiated Gottfredson and Hirschi's claims (e.g., claims linking self-control, sex, and race or ethnicity); however, other findings are at odds with their theory (e.g., the unchanging nature of self-control). The authors review the implications of these findings for self-control theory.

Keywords: delinquency theory; panel study; concept stability

At the core of Gottfredson and Hirschi's (1990) general theory of crime—what is also known as event-propensity theory (Gottfredson & Hirschi, 1989) and self-control theory (Grasmick, Tittle, Bursik, & Arneklev, 1993)—is the stability across the life course of certain propensities that pre-

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dict short-term, circumscribed events, specifically crimes and theoretically related acts. Once established, these propensities do not change. In describing crime-prone persons as lacking sufficient restraint, Gottfredson and Hirschi (1990; see also Gottfredson & Hirschi, 1989) advanced the idea that such propensities are more similar to the notion of the conscience than criminality, but they use the term *self-control* as an all-inclusive construct. That is, persons with lower levels of self-control are less restrained from committing crimes than are persons with higher levels of self-control: "Lack of restraint or low self-control allows almost any deviant, criminal, exciting, or dangerous act" (Gottfredson & Hirschi, 1990, p. 88).

Gottfredson and Hirschi (1989) earlier described low self-control persons as impulsive, aggressive, and self-centered, but in *A General Theory of Crime* (1990), they identified a series of specific self-control elements. Importantly for those who would later test self-control theory, Grasmick and associates (1993) provide operational restatements of these elements. For example, Gottfredson and Hirschi wrote that low self-control persons seek immediate gratification because they have a here-and-now orientation; in a related vein, crimes provide few or meager long-term benefits. Grasmick and associates (1993) viewed these twin elements as evidencing the single trait of impulsivity. Second, criminal acts "provide easy or simple gratification of desires" (Gottfredson & Hirschi, 1990, p. 89), suggesting to Grasmick and associates a preference for simple tasks. Third, Gottfredson and Hirschi (1990) noted that criminal acts are often exciting, risky, or thrilling; hence, people with low self-control tend to be "adventuresome, active, and physi-

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cal." For Grasmick and associates (1993) these traits added a risk-seeking component to self-control. Fourth, Gottfredson and Hirschi saw crimes as generally requiring little skill or training, and those lacking in self-control tended to avoid or devalue cognitive and academic skills generally, elements that Grasmick and associates (1993) viewed as collectively supporting a physical activities' component. Fifth, low self-controls exhibited little concern for the care, discomfort, and welfare of those they harm, characteristics Grasmick and associates circumscribed within the trait of self-centeredness. Finally, according to Gottfredson and Hirschi (1990), crime allows low self-control persons a means to vent their intolerance for frustrations, especially given their proclivity for responding to conflict physically rather than verbally. Grasmick and associates (1993) saw a temper component in this part of self-control.

Gottfredson and Hirschi (1989, 1990) noted that early child-rearing practices are the source of these essential traits. Poor or inadequate child-rearing practices in the first decade of life set in motion forces, traits, or propensities that do not in themselves lead inevitably to crime but "in the absence of socialization the child will tend to be high on *crime potential*" (Gottfredson & Hirschi 1989, p. 61; emphasis added). This notion—that children as young as 10 may possess the necessary propensities toward crime—suggests that other criminological theories that locate the crime-causing forces closer to the law-violating event itself are wrong. Other things happen to the low self-control children, claimed Gottfredson and Hirschi, such as poor school performance or chronic difficulties with other adults and authority figures such as police and employers; but these are consequences and not causes. As a result, low self-control children—and later the young adults—enter school, the work place, and the social world with traits that are often in contradiction to their immediate social environment.

Gottfredson and Hirschi (1990) also saw sex and race as uniquely tied to the extant patterns of self-control in a given youth. However, consistent with the core assumptions of their theory, they observe that "low self-control is not produced by training, tutelage, or socialization . . . . [T]he causes of low self-control are negative rather than positive; self-control is unlikely in the absence of effort, intended or unintended, to create it" (Gottfredson & Hirschi, 1990, p. 95). What happens is largely a result of the variable patterns of early childhood supervision experienced by boys versus girls and Whites versus ethnic and racial minorities. Parents and guardians supervise girls more closely than boys but socialize them the same, claimed Gottfredson and Hirschi (1990): "Parents may foster the same antidelinquent attitudes and behaviors in their children even as they supervise them differently" (p. 149). As a result, females have higher levels of self-control than boys and

less subsequent delinquency or analogous behavior. Similarly, parents of White children—even boys—supervise them more closely than do the parents of minority youths. The parents do not endorse criminality, claimed Gottfredson and Hirschi; rather, differential patterns of monitoring, recognizing, and correcting evidence of antisocial behavior are at fault, with those practiced within minority families perhaps serving as a primary causal force (Gottfredson & Hirschi, 1990; see also Harrison, Wilson, Pine, Chan, & Buriel, 1990; Turner & Piquero, 2002). Lower self-control levels among non-White children are—along with higher in-group levels of delinquency and analogous behavior—predictable consequences of these putative differences in racial and ethnic differences in parental supervision.

The claim that self-control levels are fixed by early adolescence is viewed by some as a core part of Gottfredson and Hirschi's (1990) general theory of crime (Arneklev, Grasmick, & Bursik, 1999; Bartusch, Lynam, Moffitt, & Silva, 1997; Cohen & Vila, 1995; Turner & Piquero, 2002; Wright, Caspi, Moffitt, & Silva, 1999). If Gottfredson and Hirschi's claims—that age is irrelevant and the propensity and traits are constant through the life span—are without merit, then the theory itself, which emphasizes the role of poor parenting in creating these propensities, is also suspect.

EXPLORING THE MEASUREMENT AND IMPLICATIONS OF SELF-CONTROLS'S CLAIM OF INVARIABILITY

Those researchers exploring the invariability claim have tended to employ two primary analytic approaches. The first approach contrasts low self-control's ability to predict disruptive or law-violating behavior at different ages with the predictive values provided by another theory. For example, Bartusch et al. (1997) used longitudinal measures of Moffitt's (1993) developmental theory and Gottfredson and Hirschi's (1990) general theory. They reported that childhood and adolescent antisocial behavior across the various ages was consistent with Moffitt's predictions that the causes of delinquency vary according to when the individual's begin misbehaving rather than being constant across the life course as predicted by Gottfredson and Hirschi. Wright et al. (1999) examined social-selection (self-control theory) and social-causation (social bond theory), using the same longitudinal data as Bartusch et al. (1997). They found that low self-control in childhood predicted both disrupted social bonds and criminal conduct later in the lives of the research respondents. Introducing social bonds and adolescent delinquency into the analysis of the respondents' adult crime largely mediated the effects of low self-control. Wright and associates stopped short of claiming

that the social-selection process is less important, arguing instead that the joint consideration of both social-selection and social-causation yields a more complete picture of adolescent and adult offending.

The first approach succeeds in providing unique insights into self-control's longitudinal predictive ability. That is, low levels of self-control during childhood do appear related to misbehavior in adolescence and adulthood. However, as Pratt and Cullen (2000) noted in their meta-analysis of Gottfredson and Hirschi's theory, the general predictive value of self-control over time is relatively weak. A second approach, then, explores more directly the question of the stability of self-control measures over time or place. For example, Arneklev et al. (1999) examined the claim that the form of self-control "does not change with the age of the individual or context in which the person resides" (p. 307; see also, Gottfredson & Hirschi, 1990, pp. 87, 90, 91). They compared the conceptualization of low self-control in a group of college students and adults from a different locale and found that the parameter values did not change, suggesting that their unidimensional measure of self-control was invariable across age and place. In a test-retest study among college students, Arneklev, Cochran, and Gainey (1998) found relatively stable levels of self-control during a 4-month period.

In perhaps the most comprehensive test of the stability question to date, Turner and Piquero (2002) used a national probability sample—the National Longitudinal Survey of Youth (NLSY, child-mother survey)—and both attitudinal and behavioral measures of self-control. They created a 6-item scale with moderate yet increasing reliability to measure self-control. These items bore some resemblance to the idea contained in Gottfredson and Hirschi's ideas about self-control and contextual similarities to the scales created by Grasmick and associates (1993). Given the ex post facto nature of these items and their small number, the validity of this scale is also suspect. The behavioral measures were parents' or guardians' estimates of how often their children acted in ways that could have been considered to parallel the elements of low self-control (e.g., "acts without thinking," and "bullies or is mean to others"). Turner and Piquero (2002; see also Pratt, Turner, & Piquero, 2004) used these statements to create a single composite measure of behavioral self-control. They examined seven waves of the NLSY child-mother survey, restricting their subsample to those NLSY youths who reached the age of 15 by the end of 1994.

Turner and Piquero (2002) reported three findings related to the invariability of self-control. First, offenders exhibited significantly lower behavioral and attitudinal measures of self-control than was the case for nonoffenders. Although there was a tendency for nonoffenders to report higher levels of self-control than offenders during childhood and into early

adolescence, the reverse was true in late adolescence and early adulthood. Second, they reported mixed results when examining those youths who should have been the lowest in self-control both behaviorally and attitudinally. Finally, sex and race provided mixed results as well. For example, males consistently exhibited lower self-control than females, although the trend was for higher self-control as both sexes age. As for race, non-Whites consistently were lower on self-control in childhood than Whites, a trend that was reversed in late adolescence, although these results were not statistically significant.

RESEARCH QUESTIONS

Tests that have explored the invariability of self-control over time have suffered from conceptual and methodological shortcomings. Those that looked at the role of age (and aging) generally have failed to reveal whether self-control fluctuated over time; rather, they have emphasized its predictive values compared to or paired with another theory as the respondents aged. Tests that addressed specific self-control measures over time likewise suffer from such shortcomings as no real comparisons over time, too few data points for meaningful comparisons and operational problems associated with measuring self-control. By using a multisite, multiyear panel of youths, we seek to overcome most of these problems.

We explore a series of questions related to the putative invariability of self-control. First, how stable are the measures of self-control over time, irrespective of the respondent's sex or race? Second, do the levels of self-control change over time when we compare offenders to nonoffenders? Third, does stability over time vary depending on the element of self-control employed? Finally, what happens to the stability of self-control measures when we simultaneously consider the respondent's sex, race, and family structure?

THE CURRENT STUDY

Data collected as part of the longitudinal component of the National Evaluation of the Gang Resistance Education and Training program (Esbensen, Osgood, Taylor, Peterson, & Freng, 2001) provide the context for testing the stability of self-control theory. The researchers purposively selected students attending 22 middle schools in six cities across the continental United States.[1] More than 3,500 students enrolled in 153 classrooms were eligible for inclusion in the study. Active parental consent was obtained from 2,045

(57%) of these students. The researchers subsequently surveyed the active-consent sample during the fall semester for 5 consecutive years (1995 to 1999). At the outset of the study, the students were in the 6th or 7th grade. During the past year of data collection, those still enrolled in school were in the 10th or 11th grade.[2]

We restricted our analyses to those students who had completed questionnaires during each of the 5 years. This step further reduced our sample to 965 respondents, of whom 445 (46%) were male and 520 (54%) were female. The sample was also racially and ethnically diverse (African Americans comprised 13% of the sample, and Hispanics comprised 18%) and included a mix of offenders and nonoffenders.[3] Compared with the active-consent sample, the complete sample used in the current study included proportionately more White youths and proportionately fewer African Americans and youths of other races, proportionately more youths from intact families (both mother and father present), and proportionately fewer offenders. Youths in the current study were also slightly younger (mean age 12.09 years for the current sample compared with mean age of 12.14 years for the active-consent sample), and exhibited slightly lower levels of self-control, along with higher impulsivity and risk seeking. Although not substantively large, these differences were statistically significant, suggesting that the sample used in the current study includes slightly lower risk youths than the entire active-consent sample. Table 1 contains a summary of key sample characteristics.

The Variables

We derived a series of independent variables from the self-control literature. Respondents' sex (*male* or *female*), race or ethnicity (*White/Anglo*, *non-Hispanic*; *Black/African American*; *Hispanic/Latino*, *American Indian/Native American*, *Asian/Pacific Islander/Oriental*, or *other* race), family structure (*mother only*, *father only*, *both mother and father*, or *other living arrangement*), and offending behavior (17 delinquency items, ranging from less serious offenses such as *skipping school without an excuse* to more serious offenses such as *shooting at someone*) were collected through self-reports. Small numbers of American Indians, Asians, and members of other races led us to recode the respondents' race or ethnicity into four categories (*White*, *African American*, *Hispanic*, and *other races*) for all analyses. Additionally, we followed Gottfredson and Hirschi's (1990) lead by dichotomizing the family structure variable into *intact* (i.e., residing with both mother and father) and *other living arrangement* (i.e., residing in any arrangement than both father and mother in the home) for all analyses.

TABLE 1: Sample Characteristics

Variable	Active Consent Sample (n = 2,045)				Complete Sample (n = 965)				Significance Tests
	%	n	M	SD	%	n	M	SD	
Sex									
Male	47.3	966			46.1	445			χ^2 =1.085, p > .05
Female	52.7	1,075			53.9	520			
Race and ethnicity									
White	52.1	1,062			59.6	575			
African American	16.6	339			13.2	127			
Hispanic	17.5	356			17.8	172			
Other	13.9	283			9.4	91			χ^2 = 59.296, p < .001
Age			12.14	.62			12.09	.57	t = 3.153, p < .01
Live with:									
Both parents	63.6	1,169			71.0	681			
Other living arrangement	36.4	669			29.0	278			χ^2 = 47.599, p < .001
Offender status (Time 1)									
Nonoffender	40.2	740			43.4	417			
Offender	59.8	1,101			56.6	543			χ^2 = 8.771, p < .01
T1 measures									
General low self-control			2.94	.68			2.87	.69	t = 2.976, p < .01
Impulsivity			2.90	.69			2.86	.70	t = 2.368, p < .05
Risk seeking			2.90	.92			2.86	.92	t = 2.278, p < .05

*p < .05.

Self-control's unidimensionality is a much-debated topic (Winfree & Abadinsky, 2003). As presented by Gottfredson and Hirschi (1990), *self-control* appears to be a single variable trait. However, in their conceptual and operational processes, Grasmick and associates (1993) opened the door to the possibility that self-control is multidimensional. Supporters and detractors have debated this topic nearly since the first application of the scales created by Grasmick and associates. Early evidence supported its unidimensionality (Arneklev, Grasmick, & Bursik, 1999; Grasmick et al., 1993); however, later analyses suggested that the construct of self-control does indeed have multiple dimensions (DeLisi, Hochstetler, & Murphy, 2003; Longshore, Stein, & Turner, 1998; Longshore, Turner, & Stein, 1996; Piquero & Rosay, 1998; Turner & Piquero, 2002; Wood, Pfefferbaum, & Arneklev, 1993). This debate is far from settled; hence, we elected to use a global self-control measure before performing analyses on the two most prominent and conceptually interesting dimensions of self-control (impulsivity and risk seeking).[4]

At each survey administration, respondents indicated their level of agreement with eight self-control items drawn from Grasmick and associates (1993). Specifically, we created two 4-item scales to measure risk seeking[5] and impulsivity.[6] Scores on each of these items ranged from one to five, with higher scores indicating greater levels of risk seeking and impulsivity (i.e., lower self-control). We also combined the impulsivity and risk-seeking scales into a global measure of self-control by summing the values and dividing by the number of indicators. The reliability of the global self-control scale, like the two subscales, was acceptable.[7]

Further examination of the scale, however, raised questions as to whether it was unidimensional. A principal components analysis with varimax rotation conducted with each wave of data produced two factors with eigen values greater than 1.0 for each period. Additionally, there were visible breaks between the second and third factors during each period. We then disaggregated the sample by sex and race and replicated the analyses using each wave of data. The multidimensionality of self-control held for males and females at each temporal period. We observed minimal differences by race or ethnicity, with three factors present for African Americans in 1995 and one factor for Hispanics in 1996 and 1997. For all other comparisons, however, the results were consistent with those conducted on the total sample. The appendix summarizes the results of these analyses for the 1995 (Time 1) survey.[8]

ANALYSES AND RESULTS

The first task was to examine whether levels of self-control remained stable during adolescence. We conducted analyses using both the *Statistical Package for the Social Sciences* and *Stata—Statistical Software for Professionals* computer software packages. At each data point, we structured the analyses to examine first a global measure of self-control before separately assessing impulsivity and risk seeking.

Stability Coefficients

We employed stability coefficients to assess preliminarily the relative stability during 5 years of the composite self-control measure and each subcomponent for the entire sample. Over time, risk seeking proved to be more stable than impulsivity. The correlation for impulsivity between 1995 and 1996 was .44, and by 1999, it had dropped to .28. For risk seeking, the correlation between 1995 and 1996 was .59, which dropped to .43 by 1999. The general self-control measure showed similar interyear correlations as those of risk seeking. Table 2 contains the stability coefficients for each self-control component during the period of study.

Stata provided an estimate of the variability of self-control during the study period through the calculation of the overall mean, which is the average value of the variable during the period examined.[9] The overall mean of the composite *low self-control* variable was 2.76, *impulsivity* was 2.66, and *risk seeking* was 2.86. A visual examination of the score means (Table 3), however, shows differences in stability between different components of self-control over time. Levels of impulsivity declined steadily during the 5 years (from 2.86 in 1995 to 2.52 in 1999), although levels of risk seeking showed no clear pattern of change. The general self-control measure declined between 1995 and 1996, reached a plateau and remained stable between 1996 and 1997, and declined again between 1997 and 1998.

Differences by Sex and Race

A series of *t* tests and analysis of variance (ANOVA) analyses explored whether levels of self-control differed between males and females and between members of different racial or ethnic groups during each of the survey waves. The sex specific analyses, as summarized in Table 3, revealed a consistent pattern of significant differences between males and females on levels of self-control during the adolescent period, with males reporting lower levels of self-control than females. Males reported significantly higher

TABLE 2: Year-to-Year Correlations for the Self-Control Measures*

	Low Self-Control					Impulsivity					Risk Seeking				
	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
1995	1.00					1.00					1.00				
1996	0.58	1.00				0.44	1.00				0.59	1.00			
1997	0.48	0.63	1.00			0.34	0.53	1.00			0.48	0.62	1.00		
1998	0.44	0.55	0.67	1.00		0.29	0.45	0.56	1.00		0.44	0.54	0.66	1.00	
1999	0.44	0.52	0.57	0.68	1.00	0.28	0.44	0.50	0.58	1.00	0.43	0.52	0.56	0.68	1.00

*$p < .01$. All correlation coefficients are statistically significant.

TABLE 3: Measures of Self-Control by Sex and Race, Across Five Waves of Data

	Total (n = 965)		Male (n = 445)		Female (n = 520)		White (n = 575)		Black (n = 127)		Hispanic (n = 172)		Other (n = 91)	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Low self-control Panel:[1]														
Overall[ab]	2.76	.73	2.89	.72	2.65	.73	2.78	.73	2.61	.71	2.86	.73	2.69	.77
Within		.44		.44		.44		.43		.46		.46		.42
Between		.59		.58		.58		.59		.54		.58		.65
1995[a]	2.87	.69	2.99	.71	2.76	.65	2.85	.69	2.83	.69	2.98	.68	2.79	.67
1996[ab]	2.78	.76	2.87	.75	2.71	.77	2.79	.77	2.63	.69	2.92	.76	2.71	.80
1997[a]	2.80	.76	2.94	.73	2.69	.77	2.79	.76	2.69	.69	2.92	.76	2.78	.83
1998[ab]	2.70	.73	2.83	.70	2.59	.73	2.74	.72	2.46	.69	2.80	.73	2.59	.75
1999[ab]	2.66	.71	2.82	.69	2.53	.70	2.70	.69	2.49	.72	2.69	.71	2.60	.78
Impulsivity Panel:														
Overall[ab]	2.66	.75	2.74	.75	2.59	.75	2.62	.75	2.65	.74	2.81	.74	2.64	.75
Within		.51		.51		.51		.50		.53		.51		.50
Between		.55		.55		.55		.56		.52		.54		.57
1995[b]	2.86	.70	2.90	.73	2.83	.68	2.80	.70	2.91	.71	3.03	.68	2.84	.65
1996[b]	2.69	.76	2.72	.77	2.66	.75	2.62	.75	2.72	.75	2.87	.75	2.71	.76
1997[ab]	2.67	.77	2.79	.76	2.56	.76	2.60	.76	2.72	.71	2.83	.77	2.70	.81
1998[ab]	2.57	.74	2.66	.73	2.50	.75	2.56	.76	2.47	.67	2.73	.73	2.47	.72
1999[a]	2.52	.75	2.64	.75	2.42	.73	2.51	.75	2.46	.77	2.61	.71	2.49	.74

Risk seeking

Panel:

Overall[a,b]	2.86	.92	3.03	.90	2.71	.91	2.93	.90	2.57	.88	2.88	.91	2.76	0.99
Within		.55		.53		.56		.54		.57		.57		0.55
Between		.74		.73		.72		.73		.68		.70		0.83
1995[a,b]	2.86	.92	3.05	.94	2.69	.87	2.90	.92	2.66	.88	2.90	.91	2.78	0.99
1996[a,b]	2.88	.95	3.03	.94	2.75	.95	2.96	.95	2.56	.88	2.94	.93	2.73	1.01
1997[a,b]	2.93	.95	3.08	.91	2.80	.96	3.00	.94	2.64	.91	2.97	.92	2.86	1.06
1998[a,b]	2.83	.90	3.00	.86	2.68	.90	2.91	.88	2.46	.88	2.86	.89	2.72	0.95
1999[a,b]	2.80	.84	2.98	.85	2.64	.85	2.89	.83	2.51	.87	2.76	.87	2.72	0.98

1. The overall and decomposed estimates are reported using panel data. The *between* measures are calculated using panel mean (i.e., the mean of x_i or an individual's averaged score on a self-control measure over five waves) as unit of analysis. The unit of analysis for the *within* estimates are transformed by first subtracting the corresponding panel means from each cross-sectional time series data point (x_{it}) and then adding the global mean (i.e., the mean of x_{it}) back in to make results comparable. If a variable does not vary over time, its within-standard deviation would be zero.

a. Statistically significant sex differences.
b. Statistically significant racial differences.

levels of risk seeking than females in each wave and significantly higher levels of impulsivity than females in each of the final three waves. Males also scored significantly higher on the general self-control measure in each of the five periods.

We then used one-way ANOVA analyses to determine whether there were racial differences in levels of self-control during adolescence (data not shown). Similar to the differences found by sex, the members of the various racial and ethnic groups had statistically significant differences for risk seeking in each of the five waves, statistically significant differences in impulsivity for the first four waves, and statistically significant differences in the general self-control measure in 1996, 1998, and 1999 ($p < .05$ in all analyses).

Although ANOVA analyses allow for an examination of whether the group-level means are significantly different, it does not allow for the specification of where those differences exist; however, these differences can be determined from the Bonferroni post hoc procedure (Norusis, 1999). The results of latter analyses showed that Hispanics had significantly higher levels of impulsivity than Whites did during the first 4 years; Hispanics' impulsivity levels were also higher than those reported for the *other* category but only in 1998. Examinations of risk seeking also showed differences among racial groups. For example, African American reported significantly lower risk-taking levels than Whites did during the final four waves and significantly lower levels than Hispanics during 1996, 1997, and 1998. Hispanics reported significantly more self-control than African Americans did in 1996, but the situation was the reverse in 1998. Additionally, Whites reported significantly lower self-control levels than African Americans in 1998 and 1999.

Differences by Offender Status

At the next stage in the analysis, we categorized respondents as *offenders* and *nonoffenders*, depending on their self-reported delinquency during the period immediately prior to the survey administration. For example, we classified respondents who reported at the first administration that they had engaged in each of 17 delinquent activities zero times during the past year as *nonoffenders*. Conversely, we classified those respondents who indicated that they had engaged in one or more of the delinquent activities one or more times in the prior year as *offenders*. We used the same method to classify respondents into *offender* and *nonoffender* categories during each of the temporal periods, resulting in five groups of offenders and five groups of nonoffenders.

Stata revealed whether group-level differences in impulsivity and risk seeking existed between offenders and nonoffenders (Table 4). First, two sets of *t* tests were used to determine whether the overall means of impulsivity and risk seeking differed between offenders and nonoffenders. For instance, nonoffenders reported significantly lower mean levels of impulsivity (mean = 2.45), risk seeking (mean = 2.42), and higher levels of general self-control (mean = 2.44) than those reported by offenders (means of 2.77, 3.10, and 2.94, respectively). Additionally, at no time were levels of impulsivity or risk seeking higher for nonoffenders than for offenders; similarly, in no period did general self-control of offenders exceed that of nonoffenders.

To examine the issue further, we restricted analyses to those respondents ranking in the top and bottom quartiles of impulsivity, risk seeking, and general self-control of each of the offender and nonoffender groups. We partitioned respondents into these two groups based on the assumption that those individuals who scored on the extremes of the self-control continuum that should be the focus of criminological research.[10] This approach produced a four-tiered typology: (a) nonoffenders with high self-control, (b) nonoffenders with low self-control, (c) offenders with high self-control, and (d) offenders with low self-control (Table 4).

The observed patterns varied slightly across these four groups. On the general self-control measure, we found different patterns for each of the four groups. Nonoffenders with the highest levels of self-control (i.e., those in the bottom 25% of the low self-control group) showed a sharp decline between Time 1 and Time 2. The level of general self-control then stabilized. Nonoffenders with the lowest levels of self-control (i.e., those in the top 25% of the low self-control group), however, showed a steady, gradual decline in low self-control during the 5 years of the study. Interestingly, the patterns for offenders with the lowest levels of self-control were quite similar to those for nonoffenders with the lowest levels of self-control. Offenders with the highest levels of self-control, however, illustrated no consistent pattern over time.

The patterns illustrated in the general self-control measure, mask important differences in patterns of impulsivity and risk seeking across groups. For nonoffenders in both the top and bottom quartiles, levels of impulsivity and risk seeking declined over time from their Time 1 highs. For low self-control nonoffenders and offenders (i.e., those in the top 25% of impulsivity), levels of impulsivity declined sharply between Time 1 and Time 2, where they then remained stable for two or three periods before dropping once again. For high self-control offenders and nonoffenders (i.e., those in the bottom 25% of impulsivity), there was no consistent pattern. High self-control nonoffenders showed an initial drop in impulsivity after Time 1 but then showed nearly equal levels at Times 2 and 4 and at Times 3 and 5. Conversely, high self-con-

TABLE 4: Measures of Self-Control by Offender Status Across Five Waves of Data

Dependent Variable/Sample	Nonoffenders							Offenders						
	Group			Bottom 25%		Top 25%		Group			Bottom 25%		Top 25%	
	n	M	SD	M	SD	M	SD	n	M	SD	M	SD	M	SD
Low self-control Panel:														
Overall[a]	1,650	2.44	.67					2,921	2.94	.70				
Within			.36							.41				
Between			.59							.59				
Cross-section:														
1995[b]	362	2.61	.64	1.80	.33	3.41	.31	543	3.04	.65	2.21	.29	3.91	.32
1996[b]	317	2.40	.71	1.53	.28	3.33	.38	588	2.97	.72	2.02	.33	3.86	.34
1997[b]	343	2.40	.68	1.52	.24	3.25	.27	590	3.03	.71	2.12	.38	3.89	.36
1998[b]	339	2.36	.66	1.53	.29	3.18	.31	597	2.89	.69	2.03	.35	3.74	.36
1999[b]	289	2.38	.65	1.53	.31	3.15	.26	658	2.78	.69	1.90	.34	3.70	.33
Impulsivity Panel:														
Overall[a]	1,709	2.45	.72					3,004	2.77	.74				
Within			.43							.48				
Between			.62							.58				
Cross-section:														
1995[b]	417	2.73	.70	1.88	.38	3.55	.37	543	2.95	.68	2.16	.39	3.82	.39
1996[b]	332	2.43	.72	1.64	.34	3.29	.37	614	2.81	.74	2.40	.49	3.64	.38
1997[b]	352	2.38	.70	1.48	.25	3.28	.30	604	2.83	.76	1.95	.35	3.66	.42
1998[b]	342	2.34	.68	1.68	.35	3.13	.38	607	2.70	.74	1.89	.34	3.61	.40
1999[b]	292	2.32	.71	1.46	.28	3.14	.40	667	2.60	.74	1.72	.32	3.41	.40

Risk seeking

Panel:													
Overall[a]	1,718	2.42	.84					3,018	3.10	.87			
Within			.46							.51			
Between			.75							.74			
Cross-section:													
1995[b]	417	2.48	.84	1.60	.38	3.47	.43	543	3.12	.87	2.09	.41	4.12	.41
1996[b]	332	2.38	.86	1.36	.28	3.38	.41	614	3.14	.89	2.03	.42	4.14	.43
1997[b]	352	2.41	.84	1.35	.28	3.34	.37	604	3.23	.88	2.24	.50	4.12	.41
1998[b]	342	2.37	.83	1.35	.29	3.35	.36	607	3.08	.83	2.04	.41	4.06	.38
1999[b]	292	2.44	.81	1.39	.31	3.38	.31	667	2.95	.84	1.84	.44	3.81	.38

a. Statistically significant difference based on *t* tests: nonoffenders vs. offenders.

b. Statistically significant difference based on *t* tests: bottom 25% vs. top 25%, where top 25% indicates lowest self-control.

*p < .01.

trol offenders showed an increase in impulsivity after Time 1 before showing a steady period of decline between Times 2 through 5. The pattern for risk seeking also varied across groups. For nonoffenders, regardless of self-control levels, risk seeking dropped between Times 1 and 2 and remained stable thereafter. For offenders in the top 25% of risk seeking, levels of risk seeking remained stable between Times 1 and 3 before beginning to decline. For offenders in the bottom 25% of risk seeking, however, levels of risk seeking dropped slightly between Times 1 and 2, increased between Times 2 and 3, and decreased after Time 3.

We then used t tests to compare group means. The mean levels of impulsivity, risk seeking, and the general self-control measure were significantly higher for offenders in the bottom 25% (when compared with nonoffenders in the bottom 25%) and for offenders in the top 25% (when compared with nonoffenders in the top 25%) at each of the survey administration periods. Equally interesting are the patterns between high self-control offenders and low self-control nonoffenders. Levels of self-control are higher for high self-control offenders (i.e., the bottom 25%) than for low self-control nonoffenders (i.e., the top 25%).

Thus, our analyses suggest that although the absolute level of self-control may vary somewhat over time, the relative intergroup rankings do not appear to change over time. These findings are similar to those reported by Turner and Piquero (2002). Our results also suggest that the relationship between self-control and offending is more complex than previously acknowledged. Specifically, there is substantial variation in levels of self-control within offender groupings, leading to high self-control offenders and low self-control nonoffenders, in addition to the commonly acknowledged low self-control offenders and high self-control nonoffenders. Indeed, our results suggest that levels of self-control are higher for a significant portion of offenders as compared with nonoffenders.

Multiple Regression Analyses

The one-way generalized least square (GLS) random-effects regression model technique allowed us to examine these factors simultaneously, whereby we ran models separately with general *self-control*, *impulsivity*, and *risk seeking* as dependent variables (see Table 5).[11] GLS models are particularly well suited to handle panel data such as those included in the present study. These analyses allowed examination of stability of self-control over time, although also providing information on variations due to sex, race, family structure, and offence.

TABLE 5: One-Way Generalized Least Square Random Effects Panel Data Analyses on Impulsivity and Risk-Seeking Measures Across Five Waves of Survey Data

	Low Self-Control (n = 4,563)		Impulsivity (n = 4,708)		Risk Seeking (n = 4,729)	
	B	SE	B	SE	B	SE
Sex (female)	−.17*	.03	−.11*	.04	−.22*	.04
Race						
Black	−.19*	.06	.00	.05	−.39*	.07
Hispanic	.06	.05	.18*	.05	−.07	.06
Other	−.05	.06	.03	.06	−.12	.07
Family structure						
(intact family)	−.04	.04	−.06	.04	−.03	.05
Offender status (offender)	.35*	.04	.26*	.04	.45*	.05
Year dummy						
Year 1996	−.08*	.02	−.18*	.03	.04	.03
Year 1997	−.06*	.02	−.20*	.03	.09*	.03
Year 1998	−.16*	.02	−.29*	.03	−.01	.03
Year 1999	−.20*	.02	−.34*	.03	−.04	.03
Constant	2.81*	.05	2.78*	.05	2.81*	.06
σ_{u}[#]	.50		.47		.62	
$\sigma\varepsilon_{it}$	.48		.55		.61	
ρ	.52		.42		.50	
R^2	.10		.07		.10	
Wald χ^2	248.09*		297.70*		204.19*	
Diagnostic tests:						
B & P Lagrangian						
test[1]:	2,308.36*		1,595.18*		2,336.54*	
Hausman test[2]:	2.22		4.68		3.29	

[#] σ_u is the standard deviation of u_i. $\sigma\varepsilon_{it}$ is the standard deviation of ε_{it}. ρ reflects the fraction of variance because of random effects.
1. Breusch and Pagan Lagrangian multiplier test (for random effect):
Low Self-Control $[i,t] = Xb + u[i] + e[i,t]$
Impulsivity $[i,t] = Xb + u[i] + e[i,t]$
Risk seeking $[i,t] = Xb + u[i] + e[i,t]$
Test H: Var(u) = 0
2. Hausman (Model) specification test (fixed effects vs. random effects):
Test H_0: Difference in coefficients not systematic.
*$p < .01$.

In each model, dummy variables were included for sex, race, family structure, offender status, and survey administration period.[12] Results of these analyses showed that females had significantly lower levels of impulsivity, risk seeking, and general low self-control than males, controlling for the effects of race, family structure, offending, and time. Race differences also

remained salient. Even after controlling for sex, family structure, offending, and survey period, levels of impulsivity were higher for Hispanics and levels of risk seeking and general low self-control were lower for African Americans when compared with Whites. *Family structure*, included here as a control variable, exerted no significant effect on the composite self-control measure or its various components.[13]

The regression analyses presented a mixed picture for the stability of self-control over time. Each of the dummy variables representing the survey administration periods was a significant predictor of levels of impulsivity and the general self-control measure, reinforcing the view that levels of impulsivity and general self-control varied over time, even after controlling for the effects of sex, race, family structure, and offending status. For risk seeking, however, only one survey administration period was a significant predictor.[14] This finding suggests that although levels of risk seeking were relatively consistent, the levels of impulsivity may in fact vary over time. Additionally, using a general self-control measure may mask important differences between various components.

Next, we examined differences between offenders' and nonoffenders' levels of self-control, controlling for the effects of sex, race, family structure, and time. To accomplish this goal, we partitioned the sample by offender status and reran the models.[15] Following the process outlined by Clogg, Petkova, and Haritou (1995) and Paternoster, Brame, Mazerolle, and Piquero (1998), we calculated *Z* scores to compare the effect of the regression coefficients across models.[16] We present the results of these models in Tables 6 through 8.

For both nonoffenders and offenders, general low self-control was lower for females than for males, controlling for the effects of race or ethnicity, family structure, and time. Key differences across nonoffenders and offenders did exist, however, regarding the effects of race or ethnicity and family structure. Controlling for the effects of sex, family status, and time, African American offenders exhibited significantly higher levels of self-control than White offenders, although we found no racial or ethnic differences for nonoffenders. Similarly, offenders living with both parents exhibited significantly lower levels of self-control than did offenders living in any other arrangement, controlling for the effects of sex, race or ethnicity, and time. For nonoffenders, however, we found no differences in the low self-control levels across living arrangements.

We did find additional differences between nonoffenders and offenders regarding the subcomponents of self-control, controlling for the effects of sex, race/ethnicity, family structure, and time. For nonoffenders, impulsivity varied by sex, race/ethnicity, and time, whereas offenders' impulsivity varied

TABLE 6:   One-Way Generalized Least Square Random Effects Panel Analyses on General Low Self-Control Measure Across Five Waves of Survey Data

	Nonoffenders (n = 1,973)		Offenders (n = 2,590)		
	B	SE	B	SE	Z score
Sex (female)	−0.23	.06**	−0.12	.05**	−1.41
Race					
Black	0.04	.09	−0.34	.07**	3.33**
Hispanic	0.08	.08	0.03	.06	0.50
Other	−0.01	.09	−0.09	.08	0.66
Family structure					
(intact family)	0.00	.06	−0.08	.03*	1.19
Year dummy					
Year 1996	−0.09	.03**	−0.08	.03*	−0.24
Year 1997	−0.02	.03	−0.09	.03**	1.65
Year 1998	−0.12	.03**	−0.19	.03**	1.65
Year 1999	−0.11	.03**	−0.27	.03**	0.77**
Constant	2.75	.07**	3.22	.06**	−5.10**
σ_u[#]	0.52		0.48		
$\sigma\varepsilon_{it}$	0.48		0.49		
ρ	0.55		0.50		
R^2	0.03		0.05		
Wald χ^2	38.24**		131.30**		
Diagnostic tests:					
B & P Lagrangian test:	1,090.78**		1,198.89**		
Hausman test:	0.80		2.45		

[#] σ_u is the standard deviation of u_i. $\sigma\varepsilon_{it}$ is the standard deviation of ε_{it}. ρ reflects the fraction of variance because of random effects.
1. Breusch and Pagan Lagrangian multiplier test (for random effect):
Low self-control $[i,t] = Xb + u[i] + e[i,t]$; Impulsivity $[i,t] = Xb + u[i] + e[i,t]$; Risk seeking $[i,t] = Xb + u[i] + e[i,t]$; Test H_0: $Var(u) = 0$.
2. Hausman (Model) specification test (fixed effects vs. random effects): Test H_0: Difference in coefficients not systematic.
*$p < .05$; **$p < .01$.

by race/ethnicity and time only. Female nonoffenders exhibited lower levels of impulsivity than males, whereas African Americans and Hispanics exhibited higher levels of impulsivity than White youths. Hispanic offenders also exhibited higher levels of impulsivity than did White offenders. Interestingly, although not statistically significant, impulsivity was lower among African American offenders than among White offenders, suggesting an important interaction between being African American and offending status. For both offenders and nonoffenders, sex was a significant predictor of risk seeking, with females exhibiting the lower levels of risk seeking. The effect of being

TABLE 7:   One-Way Generalized Least Square Random Effects Panel Analyses on Impulsivity Measure across Five Waves of Survey Data

	Nonoffenders (n = 2,049)		Offenders (n = 2,659)		
	B	SE	B	SE	Z score
Sex (female)	−0.15	.06**	−0.08	.05	−0.90
Race					
Black	0.19	.09*	−0.12	.07	2.72**
Hispanic	0.23	.07**	0.14	.06*	0.98
Other	0.03	.09	0.03	.08	0.00
Family structure					
(intact family)	−0.00	.06	−0.09	.05	1.15
Year dummy					
Year 1996	−0.27	.04**	−0.11	.03**	−3.20**
Year 1997	−0.23	.04**	−0.17	.03**	−1.20
Year 1998	−0.33	.04**	−0.27	.03**	−1.20
Year 1999	−0.35	.04**	−0.33	.03**	−0.40
Constant	2.78	.07**	3.05	.06**	−2.93**
σ_{u}#	0.48		0.45		
$\sigma\varepsilon_{it}$	0.54		0.56		
ρ	0.45		0.39		
R^2	0.05		0.04		
Wald χ^2	127.96**		128.04**		
Diagnostic tests:					
B & P Lagrangian test:	802.52**		786.42**		
Hausman test:	0.00		1.15		

σ_u is the standard deviation of u_i. $\sigma\varepsilon_{it}$ is the standard deviation of ε_{it}. ρ reflects the fraction of variance because of random effects.
1. Breusch and Pagan Lagrangian multiplier test (for random effect): Low self-control $[i,t] = Xb + u[i] + e[i,t]$; Impulsivity $[i,t] = Xb + u[i] + e[i,t]$; Risk seeking $[i,t] = Xb + u[i] + e[i,t]$; Test H_0: Var(u) = 0.
2. Hausman (model) specification test (fixed effects vs. random effects): Test H_0: Difference in coefficients not systematic.
*$p < .05$. **$p < .01$.

African American on risk seeking also varied significantly by offending status, suggesting an important interaction; specifically, African American offenders exhibited significantly lower levels of risk seeking than White offenders, wheras no significant differences were found between African American and White nonoffenders.

As for the stability of self-control, we found differences between offenders and nonoffenders and across different manifestations of self-control. (For ease of interpretation, we present these changes graphically in Figures 1 through 3.) Controlling for the effects of sex, race/ethnicity, and family structure, nonoffenders showed significantly lower levels of general low

TABLE 8: One-Way Generalized Least Square Random Effects Panel Analyses on Risk Seeking Measure across Five Waves of Survey Data

	Nonoffenders (n = 2,057)		Offenders (n = 2,672)		
	B	SE	B	SE	Z score
Sex (female)	−0.30	.07**	−0.16	0.06*	−1.52
Race					
Black	−0.12	.11	−0.57	.09**	3.17**
Hispanic	−0.08	.09	−0.07	.07	−0.09
Other	−0.07	.12	−0.16	.10	0.58
Family structure					
(intact family)	0.01	.08	−0.06	.06	0.70
Year dummy					
Year 1996	0.12	.04**	−0.03	.04	2.65**
Year 1997	0.21	.04**	0.00	.04	3.71**
Year 1998	0.10	.04*	−0.09	.04*	3.36**
Year 1999	0.15	.04**	−0.18	.04**	5.83**
Constant	2.68	.09**	3.35	.07**	−5.88**
σ_{u}[#]	0.63		0.59		
$\sigma\varepsilon_{it}$	0.62		0.60		
ρ	0.51		0.50		
R^2	0.03		0.07		
Wald χ^2	44.83**		93.72**		
Diagnostic tests:					
B & P Lagrangian test:	1,025.29**		1,304.52**		
Hausman test:	4.31		0.00		

[#] σ_u is the standard deviation of u_i. $\sigma\varepsilon_{it}$ is the standard deviation of ε_{it}. ρ reflects the fraction of variance because of random effects.
1. Breusch and Pagan Lagrangian multiplier test (for random effect): Low self-control [i,t] = Xb + u[i] + e[i,t]; Impulsivity [i,t] = Xb + u[i] + e[i,t]; Risk seeking [i,t] = Xb + u[i] + e[i,t]; Test H_0: Var(u) = 0.
2. Hausman (model) specification test (fixed effects vs. random effects): Test H_0: Difference in coefficients not systematic.
*$p < .05$. **$p < .01$.

self-control than did offenders at each temporal period. Yet general low self-control showed a more consistent decline in each of the years for offenders than for nonoffenders. Offenders' levels of general low self-control were significantly lower in 1996, 1998, and 1999 than in 1995. By 1999, however, the decrease in offenders' general low self-control was significantly larger than the decrease for nonoffenders. In other words, between 1995 and 1999, both nonoffenders and offenders exhibited decreases in levels of general low self-control, but the difference was more pronounced and consistent for offenders than for nonoffenders.
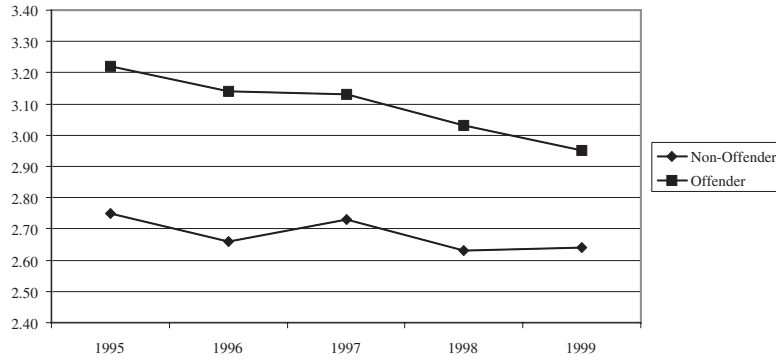
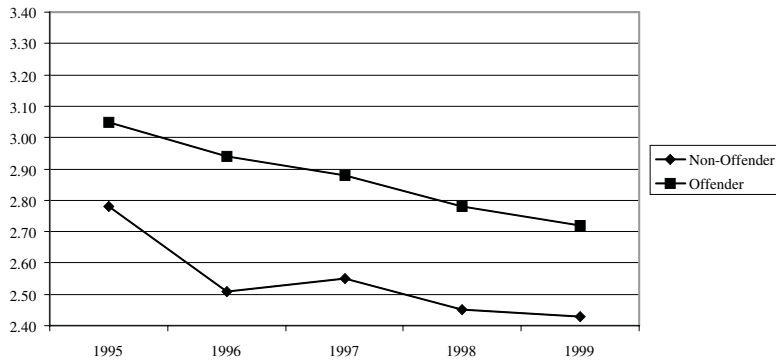**Figure 1:   Stability of General Low Self-Control by Offender Status**

Figure 2:   Stability of Impulsivity by Offender Status

Examinations of the subcomponents impulsivity and risk seeking, how-ever, demonstrate that the general low self-control measure may mask impor-tant stability differences and that these effects vary for nonoffenders and offenders, when controlling for sex, race/ethnicity, and family structure. At each temporal period, levels of both impulsivity and risk seeking were signif-icantly lower for nonoffenders than for offenders. Nonetheless, nonoffenders and offenders showed important differences in their changes in impulsivity and risk seeking over time. For both nonoffenders and offenders, levels of
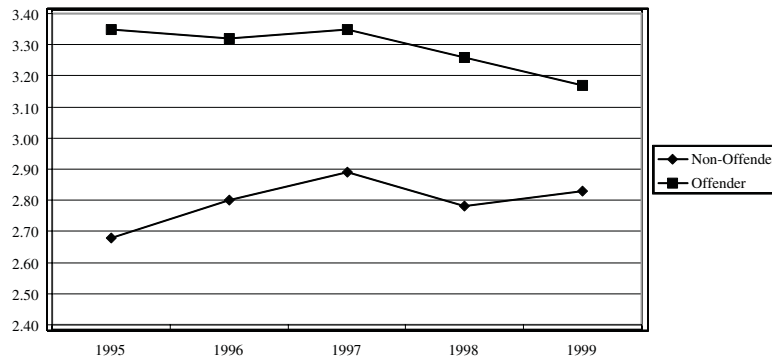
Figure 3:   Stability of Risk Seeking by Offender Status

impulsivity were significantly lower in 1996, 1997, 1998, and 1999 than in 1995. The initial drop (between 1995 and 1996) was, however, significantly more pronounced for nonoffenders than for offenders, but the rate of change between nonoffenders and offenders did not differ significantly at any other period. Patterns for risk seeking, however, showed a very different pattern. Levels of risk seeking were significantly higher for nonoffenders in 1996, 1997, 1998, and 1999 compared with the baseline level of 1995. Conversely, levels of offenders' risk seeking were not appreciably different between 1995 and 1996 or 1995 and 1997. In 1998 and 1999, however, offenders' levels of risk seeking were significantly lower than they had been initially. In each year, the changes in risk seeking were significantly different between nonoffenders and offenders.

SUMMARY AND CONCLUSIONS

Since its introduction, Gottfredson and Hirschi's theory has garnered a great deal of attention from criminologists. Comparative and cross-cultural studies suggest that the theory has some applicability in nations other than the United States, a finding that portends well for its claims as a general theory of crime (La Grange & Silverman, 1999; Vazsonyi, Pickering, Junger, & Hessing, 2001). For example, La Grange and Silverman (1999, p. 63), in a study of Canadian secondary school students found that risk seeking and impulsivity were "robust predictors of increased delinquency, of various

types and to varying degrees." Girls were far less prone to engage in risk-taking behavior, although it substantially increased their delinquency; boys, for their part, were far more impulsive, a trait that increased their likelihood for delinquency. A study that examined self-control levels among adolescents in Hungary, the Netherlands, Switzerland, and the United States also supported the idea that self-control is a multidimensional construct (Vazsonyi et al., 2001). Generally, the comparative studies to date provide at least guarded support for much of Gottfredson and Hirschi's theorizing.

Even when research fails to yield support for all of Gottfredson and Hirschi's contentions concerning the role of self-control in shaping future conduct, the general tendency is to value the theory for its conceptual richness and extension of social causation models. In this regard, consider Wright and associates' (1999) mixed selection-causation model or Paternoster and Brame's (1997) contention that the data do not support either a pure status/general model or a pure developmental model of crime. Importantly for us, Paternoster and Brame (1997, p. 74) observed the following: "The results of our analysis suggest that an exclusive focus on characteristics of individuals that do not change over time after the beginning of adolescence is inconsistent with the data."

We addressed four questions. Our general findings are, for the most part, unequivocally critical of Gottfredson and Hirschi's orienting assumption (or claim) concerning the unchanging nature of self-control after its establishment in preadolescence. For example, levels of impulsivity declined during the entire 5 year period of the study; and, for its part, risk seeking showed no clear pattern of change, actually increasing slightly between 1995 and 1997 and then declining to levels below those observed in the study's 1st year. Our findings do not support self-control as an immutable and stable propensity; they also do not support the view that self-control, as operationalized by Grasmick and associates, is unidimensional in nature. At best, our study joins others that point to possible weaknesses in the operationalization of self-control by Grasmick and his associates; at worst, our work suggests that a unidimensional construct called self-control may not exist (see, too, DeLisi et al., 2003, p. 256).[17]

The findings with respect to sex and race or ethnicity comported well with some of Gottfredson and Hirschi's claims, both in terms of the bivariate year-by-year analyses and multivariate analyses, but less well with others. Males reported higher levels of risk seeking than did females in each wave, and higher levels of impulsivity than did females in the latter three waves: Consistently males had lower self-control levels than did females, controlling for all other factors. The findings for race, however, depend on who and what is involved. For example, African Americans were more prone to report lower

levels of risk seeking than were Whites during the final four waves of data collection and lower levels than Hispanics during the middle 3 years. Hispanics reported higher levels of impulsivity than did Whites only for the first 4 years. Again, these findings tend to support a multidimensional view of self-control.

Offender status tended to offer few clarifications of self-control stability or instability (Longshore et al., 1996; Longshore et al., 1998; Piquero & Rosay, 1998; Piquero & Tibbetts, 1996). Nonoffenders reported significantly lower levels of impulsivity and risk seeking than offenders, suggesting that nonoffenders have higher levels of self-control than offenders do. Dividing offenders and nonoffenders into the bottom and top quartiles for each element of self-control (i.e., the most and least impulsive and risk-seeking youths) created four groups for comparison purposes. For nonoffenders the pattern was one of decline for both measures, irrespective of whether they were in the group with the most self-control or the one with the least self-control. In the case of impulsivity, these declines were noticeable at two times (between Times 1 and 2 and between Times 4 and 5); however, risk seeking dropped once (between Times 1 and 2) and essentially remained flat for the subsequent surveys. The two offender groups (top and bottom quartiles) also showed declines, although in both cases these declines occurred later than for the nonoffenders. None of these group-specific patterns bodes well for self-control's invariability. However, it is interesting that the relative intergroup rankings for both impulsivity and risk seeking—that is, offenders in the lowest quartile compared to nonoffenders in the lowest quartile and offenders in the highest quartile compared to nonoffenders in the highest quartile—do not change over time.

Finally and significantly, Gottfredson and Hirschi's (1990) theory addressed the issue of parenting. It was ineffective child rearing, they claimed, that "caused" low self-control. One of the common correlates they conceptually addressed was the single-parent family. After reviewing the literature on this subject—in which children from intact families are described as having lower rates of crime—Gottfredson and Hirschi make the following claim: "The model we are using suggests that, all else being equal, one parent is sufficient. We could substitute 'mother' or 'father' for 'parents' without any obvious loss of child-rearing ability" (p. 103). However, in our study, the intact family made a small but significant impact on the level of risk seeking: Children from what were described initially as intact families had lower levels of risk seeking across all waves of the survey.

Our findings provide more reasons to question the claim that the level of self-control is invariable over time, and they further suggest that we should reexamine the suggestion that self-control is a unidimensional construct. If

self-control is truly unidimensional as some researchers have suggested, then the empirical studies may be measuring something with considerable reliability that is not self-control. Perhaps the predictive validity we report is because of the high conceptual correspondence between central elements of Grasmick and associates' (1993) form of self-control and the forms found in other theories. Consider, by way of example, the class-based risk-seeking component of Miller's (1958) lower-class culture as a generating milieu of delinquency and the various discussion of internal control as a part of social control by Reiss (1951), Nye (1958), and Reckless (1961). Similarly, criminologists often link *impulsivity*, both as a concept and a variable, to misbehavior (Akers & Sellers, 2004, pp. 28, 128, 163). This conceptual overlap could help explain why the individual measures of self-control, as operationalized by Grasmick and associates, demonstrate such high predictive value for crime and delinquency, and are clearly multidimensional. Clearly, such variables as *impulsivity* and *risk taking* play a role in the self-reported delinquency of the youths we studied. Whether these constructs are "propensities" that are established early in life remains highly speculative.

Indeed, in terms of policy implications, self-control theory suggests a refocusing of attention on at least three related "causal" factors: the absolute level of parental supervision of children prior to age 10, the differential parental supervision of girls versus boys, and the variability in parental supervision found in families of different ethnic and racial backgrounds. Programs such as the current federal initiative to "strengthen families" appear to take into consideration these factors already (Mihalic, Fagan, Irwin, Ballard, & Elliott, 2004; Mihalic, Irwin, Fagan, Ballard, & Elliott, 2004).[18] Given our findings concerning the changing nature of self-control, especially the various elements of it, such programs need not address only the families of youths less than 10 years of age. Our findings relative to race suggest that Gottfredson and Hirschi's (1990, p. 153) admonition about the misplaced efforts to ascribe differences in misconduct among the races to culture or strain may be correct. Instead, policy analysts and others interested in the disproportionality issue should, in their words "focus on differential child-rearing practices." This may include programs that target development of parent management and supervision skills as well as programs such as Olds' Nurse Home Visitation program that emphasizes early parenting skills (Olds et al., 1997; Olds et al., 1998). This focus should facilitate the generation of policies and practices that are sensitive to the needs of a wider range of racial and ethnic groups than are now available.

APPENDIX

Factor Analysis of General Low Self-Control Measure, 1995

Item	Rotated Factor Loading 1	Rotated Factor Loading 2	Eigen value	% of Variance Explained	Cumulative % Variance Explained
Often act on spur of moment without stopping to think (Impulsivity)	.365	.382	3.117	38.962	38.962
Don't devote much thought and effort to preparing for the future (Impulsivity)	.121	.639	1.260	15.747	54.709
Often do what brings pleasure now, even at cost of distant goal (Impulsivity)	.194	.724			
More concerned with short run than long run (Impulsivity)	.053	.785			
Now and then like to test self by doing something risky (Risk seeking)	.767	.142			
Sometimes take a risk just for fun of it (Risk seeking)	.862	.126			
Exciting to do things for which might get into trouble (Risk seeking)	.795	.113			
Excitement and adventure more important than security (Risk seeking)	.666	.191			

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NOTES

1. Esbensen selected the sites based on three criteria: (a) the existence of a viable G.R.E.A.T. program, (b) geographical and demographic diversity, and (c) the cooperation of school districts and law enforcement agencies to participate in the evaluation. The six cities included in the study are Philadelphia, Pennsylvania; Lincoln and Omaha, Nebraska; Las Cruces, New Mexico; Portland, Oregon; and Phoenix, Arizona.

2. The researcher attempted to obtain completed questionnaires from those youths no longer attending school.

3. For a complete description of the sampling process, active consent procedures, and annual completion rates, consult Esbensen, Miller, Taylor, He, and Freng (1999) and Esbensen, Osgood, Taylor, Peterson, and Frens. (2001).

4. Esbensen included only risk seeking and impulsivity in his longitudinal measurement instruments as these two were the only self-control dimensions directly tied to the extant G.R.E.A.T. curriculum. We feel that having only these two dimensions does not limit our examination of the stability of self-control for two primary reasons. First, risk seeking and impulsivity are two of the more general elements of self-control, ones with conceptual ties to other theories (Eysenck & Eysenck, 1985; Farrington, 1988; Frost, Moffitt, & McGee, 1989; Hagan, Simpson, Gillis, & 1979; Miller, 1958; Wilson & Herrnstein, 1985; see also Akers & Sellers, 2004; Winfree & Abadinsky, 2003). Additional tests of self-control theory have used some but not all of self-control's dimensions to good results (see, for example, Wright, Caspi, Moffitt, and Silva 1999). Second, both dimensions—along with the specific indicators included in the G.R.E.A.T. questionnaires—have exhibited considerable construct validity and reliability in a number of disaggregated studies (LaGrange & Silverman, 1999). Indeed, Longshore, Turner and Stein (1996) found that risk seeking and impulsiveness/self-centeredness (they were unable to separate the two) were as useful in predicting crimes of fraud as the overall self-control scale (see also Longshore, Stein, & Turner, 1998; Piquero & Rosay, 1998).

5. Cronbach's alpha scores for this scale over time was as follows: Time 1 = .59, Time 2 = .69, Time 3 = .73, Time 4 = .71, Time 5 = .73.

6. Cronbach's alpha scores were as follows: Time 1 = .79, Time 2 = .84, Time 3 = .85, Time 4 = .84, Time 5 = .84.

7. Cronbach's alpha scores were as follows: Time 1 = .77, Time 2 = .84, Time 3 = .85, Time 4 = .85, Time 5 = .85.

8. A copy of each of these analyses is available on request from the first author.

9. We calculated the overall mean by summing the values at each data point and dividing by the total number of data points examined.

10. This differs slightly from earlier treatments of the self-control outliers. Turner and Piquero (2002), for example, dichotomized into the lowest quartile of self-control and compared this group of lowest self-control with all others. The current approach also focuses on the differences between persons with the lowest self-control (our top 25%) but contrasts this group with persons with the highest self-control (our bottom 25%).

11. One-Way Generalized Least Square (GLS) Random-Effects Regression Model can be written as

$$Y_{it} = \beta' X_i + \mu_i + y_t + \varepsilon_{it}$$
$$E\mu_i = E\varepsilon_{it} = 0$$
$$E\mu_i^2 = \sigma_\mu^2 . E_{\mu_i \mu_t} = 0 \text{ for } i \neq j$$
$$E\varepsilon_{it}\varepsilon_{js} = \sigma_\varepsilon^2, \text{ if } i \neq j \text{ and } t \neq s(E\varepsilon_{it}\varepsilon_{js} = 0, \text{otherwise})$$

where Y_{it} is the dependent variable for individual i at year t. X_i is a set of dummy variables (i.e., sex, race, family structure) and β' captures group differences. Based on the results from two diagnostic tests (i.e., Breusch and Pagan Lagrangian multiplier test for random effects and Hausman specification test), the effects of omitted (i.e., unobserved or unmeasured) individual-specific variables, μ_i, are treated as random. The time-specific component γ_t represents four year dummy variables (1996, 1997, 1998, and 1999, with 1995 as the reference category) and ε_{it} is the error term. We also assume μ_i, γ_t, and ε_{it} are uncorrelated with X_i. This model thus specified is the one-way random-effects model, also known as the error components model (Baltagi, 2001; Hsiao, 1986, 1995; Judge et al., 1988). We carried out all estimations using STATA.

12. At the suggestion of two of the anonymous reviewers, we also examined the models using other measures of offending, such as a self-reported delinquency scale representing the number of times respondents reported engaging in each of the delinquent acts. The results of those analyses were consistent with those we present in this work. Although we agree that operationalizing offenders can take a variety of forms, we have chosen to include the offender dummy variable (i.e., those who reported engaging in any delinquent act one or more times = 1; those who reported not engaging in any delinquent act was reference) because it represents the only conceptually pure measure of the construct. Moreover, in each model, we constructed dummy variables as follows: sex (*female* = 1, male was reference); race (*Black* = 1, *Hispanic* = 1, *other* = 1; white was reference); family structure (*living with both mother and father [intact]* = 1; all other arrangements as reference); offender status (*offender* = 1; non-offender was reference); year (1996 = 1, 1997 = 1, 1998 = 1, 1999 = 1; 1995 was reference).

13. When offending was dropped from the model, the effect of family structure on risk seeking reached a level of statistical significance ($b = .05$, SE = .02, $p < .05$) with youths living with both a mother and father in the home reporting lower levels of risk seeking than other youths, controlling for the effects of sex, race, and survey administration period.

14. The coefficient for the 1997 survey ($b = .09$) was statistically significant, indicating that 1997 levels of risk seeking were higher than those in 1995, controlling for the effects of sex, race, and family structure. Interestingly, 1997 was the year that most of these students matriculated into junior high schools. Although criminologists have observed that stressful life events can cause an escalation in delinquency (Agnew, 1992; Hoffman & Cerbone, 1999), research on the transition to high school is sparse. Isakson and Jarvis (1999) reported that the average GPA of students dropped precipitously between the end of the eighth grade and the first semester of the ninth grade. Weiss too found a similar drop in GPA when students transitioned to high school, although the drop, although relatively large, was not significant. However, Lozeau (1998) failed to find changes in social acceptance or global self-worth for students making this transition. Clearly, we have much to learn about the impact of this life event on the escalation of delinquency. From a theory-testing perspective, it also suggests another life-course event that could facilitate the examination of the impact on time on offending (see Gottfredson & Hirschi, 1990; Sampson & Laub, 1993 –1995 IN REF; but see Cohen & Vila, 1995).

15. We dropped the offending variable from these models.

16. These Z-scores were calculated using the formula:

$$Z = \frac{b_1 - b_2}{\sqrt{SEb_1{}^2 + SEb_2{}^2}}$$

where b_1 and b_2 are the unstandardized regression coefficients for nonoffenders and offenders and SEb_1 and SEb_2 are the standard errors of the corresponding regression coefficients.

17. The study by DeLisi et al. (2003) is problematic in its attack on the scaling efforts of Grasmick et al. (1993) because the former deals only with an offending population, that is, a pur-

posive sample of parolees residing in a work-release facility. The current work examines a multisite sample that includes both offending and nonoffending members, albeit juveniles.

18. Several of the Blueprints for Violence Prevention programs seek to strengthen families, including those with children between 10 and 14. Because many of the youths in the current study were more than 14 and experienced changes in their levels of self-control, such an arbitrary upper limit may prove counterproductive in the quest to prevent violence.

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