

Testing the General Theory of Crime: Comparing the Effects of “Imprudent Behavior” and an Attitudinal Indicator of “Low Self-Control”

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Abstract. *The strongest criticism of Gottfredson and Hirschi’s (1990) A General Theory of Crime continues to be that it is tautological. The authors initially provided no operational definition of “low self-control” and, therefore, researchers could not really tell if an individual had this characteristic unless they committed crime. Investigators have attempted to circumvent this criticism by using either attitudinal indicators of low self-control or “analogous” behavioral measures (some of which have included illegal conduct). In this paper, we compare the efficacy of two such measures in predicting involvement in crime and other social outcome variables. In so doing, we specifically attempted to exclude illegal conduct in our behavioral measure of “imprudent behavior.” The results of our study demonstrate that the attitudinal indicator of low self-control is a relatively stronger predictor of crime than imprudent behavior. The implications of testing the theory with these and other measures are discussed.*

Key words: tautology; low self-control; imprudent behavior

Introduction

The strongest criticism of Gottfredson and Hirschi’s (1990) *A General of Crime* continues to be that the theory is tautological. The authors argued that individuals become involved in crime because they have “low self-control.” However, they initially provided no operational definition for low self-control. Therefore, investigators could not really tell if an individual had this characteristic unless they committed crime. The theory, therefore, becomes tautological when involvement in crime is used as an indicator of low self-control, and that indicator in turn is used to predict involvement in other crimes; i.e., involvement in crime predicts involvement in crime. Because of this, critics argue that the theory does not say anything more than if an individual commits crime it is because of low self-control, and it is low self-control that causes an individual to commit crime (Akers, 1991; Barlow, 1991; Geis, 2000; Marcus, 2004; Tittle, 1991).

In order to confront the tautology inherent in the theory, Grasmick and his colleagues (1993) developed an attitudinal scale of low self-control drawn from theoretical discussions of the construct. Hirschi and Gottfredson

(1993) subsequently argued that analogous behavioral measures are preferable for tests of the theory (and see Hirschi and Gottfredson, 1995; but see Tittle, Ward, and Grasmick, 2003a). Both types of indicators have been used independently in empirical tests of the theory (see Pratt and Cullen, 2002 for a review) and a few studies (e.g., Evans et al., 1997; LaGrange and Silverman, 1999; Paternoster and Brame, 1998; Tittle et al., 2003a; Wright et al., 1999) have incorporated both kinds of measures in their analyses. In this paper, we also compare the relative predictive powers of first, a self-reported analogous behavior measure and second, a self-reported attitudinal indicator of low self-control on crime and other general social outcomes (e.g., educational attainment, friendship quality, income, etc.). We diverge from some of the work that has used analogous behavioral measures, however, by intentionally excluding illegal conduct from our behavioral indicator of low self-control. To do otherwise, we believe, continues to invite and reinforce the criticism of tautology (Pratt and Cullen, 2000; Taylor, 2001; Tittle et al., 2003a; and see Peter, LaGrange, and Silverman, 2003FTN#9). Our procedures allow us to not only compare the relative effects of these two measures of low

self-control, but also to mitigate the criticism of tautology that has been leveled at the theory.

A General Theory of Crime

Due to the vast amount of research testing and discussing Gottfredson and Hirschi's (1990) theory (see Pratt and Cullen, 2000 for a review of empirical tests, and see Brannigan et al., 2002; DeLisi, 2001; DeLisi, Hochstetler, and Murphy, 2003; Gibson and Wright, 2001; Hay, 2001; Hirschi and Gottfredson, 1995; Tittle et al., 2003a; Tittle, Ward, and Grasmick 2003b; Turner and Piquero, 2002; Unnever, Cullen, and Pratt, 2003; Vazsonyi et al., 2001; Weibe, 2003), its tenets are well known. Gottfredson and Hirschi (1990) created a general theory of crime that uses the concept of low self-control to explain the commission of all criminal and analogous behavior. According to Gottfredson and Hirschi (1990:89-90), low self-control comprises six essential dimensions: impulsivity, preference for simple tasks, risk-seeking potential, preference for physical (as opposed to mental) activities, self-centeredness, and finally, the possession of a volatile temper (Arneklev et al., 1993; Arneklev, Grasmick, and Bursik, 1999; Delisi et al., 2003; Grasmick et al., 1993; Longshore, Turner, and Stein, 1996; Piquero and Rosay, 1998; Vazsonyi and Crosswhite, 2004; Wood, Pfefferbaum, and Arneklev, 1993). Low self-control is also described as a characteristic that is established early in life and remains relatively stable across the life-course. Given the opportunity to do so, individuals lacking self-control will engage in a wide range of criminal and analogous behaviors. For Gottfredson and Hirschi (1990:15) crime can largely be reduced to "acts of force or fraud undertaken in pursuit of self-interest," which is reflective of both cross-cultural and changing historical definitions of crime (and see Hirschi, 1986). Furthermore, "analogous behaviors" are acts, which though not illegal are similar to crime in that they also have immediate benefits and long-term consequences. However, individuals with low self-control will focus on the immediate benefits derived from such behaviors (just as they do with crime). For example, Gottfredson and Hirschi (1990:90, emphasis theirs) argue that people with low self-control "will also tend to pursue immediate pleasures that are *not* criminal: they will tend to smoke, drink, use drugs, gamble, have children out of wedlock, and engage in illicit sex." Finally, they also suggest that self-control acts as a "self-selection" mechanism in that individuals are "sorted into a variety of circumstances that are *as a result* correlated with crime" (Gottfredson and Hirschi, 1990:119, emphasis theirs). According to

Gottfredson and Hirschi, people with high self-control should exhibit success in legitimate social institutions, educational arenas (1990:162-163), high income potentials (1990:165), quality of interpersonal relationships with others (1990:158), marriage (1990:165-167), and the like (Gottfredson and Hirschi, 1990; Evans et al., 1997). Conversely, those with low self-control will have poor friendships, fail in school, not fare well in economic arenas, and have unhappy marriages.

Empirical Tests and the Issue of Tautology

Despite the strength of parsimony, the tautological criticism has led analysts to use either attitudinal or analogous behavioral measures of low self-control in tests of the theory. Regardless of the measures used, the majority of empirical tests have been supportive of the theory's core propositions (Pratt and Cullen, 2000; Vazsonyi et al., 2001; Vazsonyi and Crosswhite, 2004). Grasmick and his colleagues (1993), for example, found that an attitudinal indicator of low self-control, in interaction with measures of criminal opportunity, predicted involvement in force and fraud in line with theoretical expectations (and see Tittle et al., 2004). Longshore and his colleagues (1996; 1998) found the same interaction in a sample of criminal offenders. Therefore, they argued that it is possible to create and obtain valid measures of an individual's self-control level using self-reported attitudinal measures, even among a sample scoring high on criminality (see Hindelang, Hirschi, and Weis, 1981; Gottfredson and Hirschi, 1990, p. 249; but see Delisi et al., 2003; and see Vazsonyi and Crosswhite, 2004; Vazsonyi et al., 2004). Arneklev and his associates (1993) also demonstrated that an attitudinal measure of low self-control predicted involvement in self-reported "imprudent" behavior (e.g., drinking and gambling), as the theory suggests it should (and see Keane, Maxim, and Teevan, 1993; Jones and Quisenberry, 2004). Consistent with this latter approach (i.e., no measure of opportunity), other less explicit tests with attitudinal indicators of low self-control have provided evidence that low self-control explains involvement in many forms of deviant behavior (Bolin, 2004; Brownfield and Sorenson, 1993; Cochran et al., 1998; Gibbs and Geiver, 1995; Longshore et al., 1996; Vazsonyi and Crosswhite, 2004; Wood et al., 1993). In fact, more recent research has argued that opportunities for crime are "ubiquitous, and therefore, probably not of great importance in explaining individual variation in misbehavior" (Tittle et al., 2003a:342) though others might point out that success in later life course events might be dependent on opportunities that are not equally

distributed across society. Finally, Turner and Piquero (2002) found that self-reports of an attitudinal indicator of low self-control are relatively stable across time (and see Arneklev et al., 1998; Nagin and Farrington, 1992; Nagin and Land, 1993; Nagin and Paternoster, 1991, 1993; Polakowski, 1994).

Empirical tests using behavioral measures have also been supportive of the theory. Keane and his colleagues (1993:42) found that observations of “failing to wear a seat belt reflects a lifestyle favoring risk taking and is a predictor, and not a result of DUI.” Polakowski (1994) used both parental and peer reports of conduct disorder, hyperactivity and impulsivity measured at ages 8 to 10, and found that these behavioral indicators of low self-control predicted involvement in major (but not minor) deviance, at the ages of 16 and 17. However, when they introduced a measure of major deviance at the age of 14 to 15 into the analysis, the effect of self-control was reduced to insignificance. In line with Gottfredson and Hirschi’s (1990:102) position, this study suggests that involvement in crime is a better predictor of (later) involvement in crime than other measures of low self-control. In a related manner, Paternoster and Brame (1998) found that a behavioral measure of self-control at ages 8 and 9 was comparably related to involvement in less serious deviance and serious crime at age 18. These authors, however, question whether analogous behaviors are the same phenomenon as crime (and see Hirschi and Gottfredson, 1993).

One of the more significant and encompassing research projects to date has been Pratt and Cullen’s (2000) meta-analysis, which empirically summarized past tests of Gottfredson and Hirschi’s (1990) theory. The authors demonstrated that, regardless of the type of low self-control measure used, the theory explains considerable variation in criminal and analogous behaviors (even when other theories have been included in past analyses). However, a conclusion that can be drawn from their research is that behavioral measures of low self-control provide stronger predictive power relative to attitudinal indicators. As Pratt and Cullen (2000:95) point out, this conclusion is not too surprising since behavioral indicators of low self-control have tended to include “deviant behaviors (crime).”

The Present Study

Studies by Evans and his colleagues (1997) and Tittle and his associates (2003) illustrate the controversy over the preference for attitudinal or behavioral indicators of low self-control in theoretical tests. Both studies include

attitudinal and behavioral measures, yet draw opposite conclusions about the relative efficacy of each. The conflicting conclusions, we feel, are due to differences in the operationalization of the behavioral indicator of low self-control.

Evans and his associates (1997) examine the impact of behavioral and attitudinal indicators of low self-control on crime and other social outcomes (e.g., educational attainment, quality of friendships, etc.). At first glance, the findings appear to strongly support Hirschi and Gottfredson’s (1993:48) contention that “observation of behavior (e.g., failure to wear a seat belt) and through self-reports of behavior suggesting low self-control (drinking) are recommended to test the theory.” A closer examination of their indicators of analogous behavior, however, reveals that they include at least nine indicators of illegal behavior in their measure (many of which involve use of illegal drugs). The finding that self-reported behavioral involvement in some types of crime (use of illicit drugs, etc.) strongly predicts self-reported behavioral involvement in other forms of crime is not surprising. The inclusion of illegal conduct in their measure of analogous behavior also leaves the tautological criticism intact; i.e., using involvement in illegal behavior to predict involvement in other illegal behavior only “explains” that people involved in crime commit other crimes (and see Paternoster and Brame, 1998:639, FTN#4; Tittle et al., 2003a). That being said, the research does suggest that a behavioral indicator of low self-control is a much stronger predictor of criminal involvement than an attitudinal measure (and see Pratt and Cullen, 2000).

The study by Tittle and his colleagues (2003a) also examines the relative predictive power of cognitive and behavioral indicators of low self-control, yet they concluded that the measures are equally effective in predicting criminal involvement. One key difference between the two studies is that Tittle and his associates (2003a), unlike the Evans study (1997), excluded indicators of illegal conduct from their behavioral measure. The authors actually constructed three separate behavioral measures. The first, a factor scale, was composed primarily of measures of licit drug use, but also includes indicators of debt, seat belt usage, marital status, and the like. The second and third, a Guttman scale and a variety index, respectively, focused less on licit drug use, and incorporated other measures ranging from seat belt usage to investing in a retirement plan. Given Tittle et al.’s finding (1993a:353) that “the pattern of results is the same for all three, with the Guttman measure and the variety index showing somewhat lower predictive coefficients than the factor scale in almost all instances,” the authors

only presented the results for the direct comparison between the cognitive measure and the factor scale. This comparison suggests that the behavioral measure does not exert a statistically stronger influence on levels of criminal involvement than the attitudinal indicator, contradicting Gottfredson and Hirschi's (1993) assertion that behaviorally-based measures are preferable for tests of the theory.

Therefore, it seems that any conclusion about the most efficacious measure for predicting crime and other social outcomes may be dependent on how theoretical concepts, specifically behavioral indicators of low self-control, are operationalized. Moreover, this issue is also relevant to the tautological criticism aimed at Gottfredson and Hirschi's (1990) theory. If behavioral measures continue to include illegal conduct, the tautological charge will remain valid, but if researchers develop measures of analogous behavior further removed from illegal conduct (e.g., Arneklev et al., 1993; Paternoster and Brame, 1998), that still fall within Gottfredson and Hirschi's (1990) discussion of specific activities that result in immediate gratification and have distal consequences, the theoretical charge of tautology can be reduced. We refer to these types of actions as "imprudent" behavior; i.e., analogous behaviors that are not illegal. The primary difference between imprudent behaviors and analogous (criminal) behaviors is that while the former are not illegal, they (apparently) provide immediate benefits and also distal (though not legal) consequences. We believe this procedure allows us to more closely follow the directives found in the theory in our empirical test.

Therefore, our test differs from that of Evans and his associates (1997), and is somewhat similar to that of Tittle and his associates (2003a), in that we exclude illegal conduct from our behavioral measure. At the same time, our behaviorally-based measure incorporates different imprudent behaviors than those utilized in the Tittle (2003a) study. All of our measures are specifically mentioned by Gottfredson and Hirschi (1990), they provide immediate benefits, and they have distal consequences (unlike a number of the behavioral items used by Tittle et al., 2003a). Finally, we examine the impact of our measures on social outcomes other than crime, as Evans and his colleagues (1997) did.

Methodology

Sample

Data for this project were derived from a 1991 survey of a large southwestern city with a population of ap-

proximately 400,000. This was a simple random sample of adults (18 and older), which was drawn from the R.L. Polk Directory for the city.¹ Respondents were initially contacted by a letter describing the annual survey. The letter also announced that a researcher would soon be visiting in order to arrange an appointment for a face-to-face interview. Members of the target sample who could not be reached or refused to participate in the survey were replaced by random selection. Interviews were conducted by trained interviewers.

When the target size of 394 was reached, the sample was compared to the 1990 Census. This comparison revealed no significant differences between the sample and the census in percent white (82% in the sample, 84% in the general population) or percent male (46% in the sample, 47% in the population). The sample was reduced to an *n* of 391, due to missing data.

Measures

Low Self-Control (Attitudinal Indicator). Six essential dimensions are hypothesized to constitute an invariant, multidimensional low self-control trait: impulsivity, simple tasks, risk seeking, physical activities, self-centeredness, and temper (Grasmick et al., 1993; and see Arneklev et al., 1999; Piquero and Rosay, 1988). We employ Grasmick et al.'s (1993) scale to operationalize the attitudinal indicator of low self-control. The Low Self-Control indicator is derived by creating an additive linear composite of z-scores (see Grasmick et al., 1993:117 for a discussion). All responses were initially given on 4-point scales of (4) strongly agree, (3) agree somewhat, (2) disagree somewhat, and (1) strongly disagree. Persons scoring high on the items score high on Low Self-Control. Means and standard deviations for the items are listed in Table 1.

Imprudent Behavior. The second indicator of low self-control is Imprudent Behavior. These actions are often referred to as behaviors analogous to crime (Evans et al., 1997; Paternoster and Brame, 1998). In order to tap this construct, respondents were asked whether they engaged in various behaviors that are not illegal but do have distal consequences. All of the measures used in this study have either been specifically mentioned by Gottfredson and Hirschi (1990), or are strongly implied by the theory. Respondents were asked whether they smoke (1990:90, 178), drink (1990: 90, 91, 178), eat things that they feel like eating (without being concerned with how it affects their health (1990:96), whether they wear a seat belt (1990:92; and see Hirschi and Gottfredson, 1993:48; Keane et al., 1993), if they gamble (1990:90, 178), and

Table 1. Low Self-Control Scale Items

(n = 391)

Item	Mean	SD
Impulsivity component		
I don't devote much thought and effort to preparing for the future.	1.797	.834
I often do whatever brings me pleasure here and now, even at the cost of some distant goal.	2.056	.913
I'm more concerned about what happens to me in the short run than in the long run.	1.921	.937
I much prefer doing things that pay off right away rather than in the future.	2.176	.940
Simple tasks component		
I frequently try to avoid things that I know will be difficult.	2.107	.927
When things get complicated, I tend to quit or withdraw.	1.693	.777
The things in life that are easiest to do bring me the most pleasure.	2.151	.856
I dislike really hard tasks that stretch my abilities to the limit.	1.928	.871
Risk taking component		
I like to test myself every now and then by doing something a little risky.	2.872	.966
Sometimes I will take a risk just for the fun of it.	2.359	1.056
I sometimes find it exciting to do things for which I might get in trouble.	1.798	.994
Excitement and adventure are more important to me than security.	1.627	.825
Physical activities component		
If I had a choice, I would almost always rather do something physical than something mental.	2.366	.886
I almost always feel better when I am on the move than when I am sitting and thinking.	2.903	.909
I like to get out and do things more than I like to read or contemplate ideas.	2.739	.911
I seem to have more energy and a greater need for activity than most other people my age.	—	—
Self-centered component		
I try to look out for myself first, even if it means making things difficult for other people.	1.639	.768
I'm not very sympathetic to other people when they are having problems.	1.585	.793
If things I do upset people, it's their problem, not mine.	1.726	.844
I will try to get the things I want even when I know it's causing problems for other people.	1.490	.676
Temper component		
I lose my temper pretty easily.	2.013	1.009
Often, when I'm angry at people I feel more like hurting them than talking to them about why I am angry.	1.613	.833
When I am really angry, other people better stay away from me.	2.146	1.119
When I have a serious disagreement with someone, it's usually hard for me to talk about it without getting upset.	2.341	1.002

All Likert items are answered on a 4-point scale of strongly agree (4), agree somewhat (3), disagree somewhat (2), and strongly disagree (1).

Alpha reliability for the entire Low Self-Control Scale = 0.8139.

if they had been in an accident or injured themselves so severely in the last year that they had to see a doctor (1990:88-91, 92, 129-130, 147). We created an Imprudent Behavior Index with these items, which is an additive composite (the range is from 0 to 6), since Gottfredson and Hirschi (1990:178) argue that “these... ‘pleasures’ do not substitute for one another but tend to come together in bundles and clusters.”

Crime. We used Gottfredson and Hirschi’s (1990) definition of crime to derive our criminal behavior measure, along with two more traditional measures of criminal activity. We included acts of force (Force) and fraud (Fraud) undertaken in the pursuit of self-interest, in addition to taking something worth less than 20 dollars (Theft) and taking something worth more than 100 dollars

(Grand theft). Respondents were asked how many times they engaged in these behaviors in the last five years.

Examination of the univariate statistics indicates that the crime variables are highly skewed. Therefore, we recoded all responses to the 90th percentile (Nagin and Smith, 1990). A further problem, however, is that most of the respondents reported no criminal behavior. Therefore, a stringent following of this coding procedure would lead to the creation of dichotomous variables in certain instances. In this situation, the variables have been truncated to allow for three categories. This procedure follows the analytic strategy that was adopted by Grasmick et al. (1993) in their well-known early initial study. Theft ranges from 0 to 3, while Force, Fraud, and Grand Theft range from 0 to 2.

Table 2. Means and Standard Deviations for all Items

(n = 390)

Items	Mean	SD
Low self-control measures		
Low self-control scale	47.047	9.201
Imprudent behavior index	1.934	1.368
Smoke	.327	.470
Drink	.176	.382
Eat	.514	.500
Seat belt	.427	.495
Gamble	.366	.482
Accident	.123	.329
Crime measures		
Crime index	.560	1.228
Force	.126	.444
Fraud	.183	.517
Theft	.295	.694
Grand theft	.059	.303
Social consequences measures		
Quality of friendships*	9.606	1.867
Life satisfaction**	12.028	2.666
Marital status***	.606	.489
Religious attendance****	.813	.390
Educational attainment	13.563	2.687
Income	22,153.000	28.306
Controls		
Gender (male = 1, female = 0)	.453	.498
Age	46.492	17.754
White (white = 1, other = 0)	.816	.388

Note: Because of missing data, the *n* for the Crime and Income Measures are 390 and 380 Respectively.

* Alpha reliability for the quality of friendship scale = 0.7174.

** Alpha reliability for the life satisfaction scale = 0.8227.

*** Marital status is a dichotomous variable (1 = married).

**** Religious Attachment is a dichotomous variable (1 = yes, 0 = no).

As with Imprudent Behavior, we created a Crime Index. Prior to constructing this measure, we recoded Theft so that it also ranged from 0 to 2 to match the other three crime measures. In addition, we followed Evans et al.'s (1997:484-485) procedures and used factor (weighted) crime scores to construct our additive Crime Index. This Index can be seen as an indication of general criminal involvement. The means and standard deviations for Force, Fraud, Theft, Grand Theft, and the Crime Index are also listed in Table 2. The alpha reliability for the Crime Index is .68.

Social Consequences. To further examine the generality of Gottfredson and Hirschi's (1990) theory, as well as to compare the relative effects of our two indica-

tors of low self-control, we predict a number of different social outcomes in our analysis: a Quality of Friendship measure, a Life Satisfaction scale, whether the respondent was married (Marital Status), a measure tapping Religious Attendance, level of Educational Attainment, and Income.² The means and standard deviations for the items are listed in Table 2. The specific survey questions for the Imprudent Behavior items, specific crimes, Crime Index, and Social Consequences variables are listed in Appendix A. All independent measures have been standardized.

Gender (1=male, 0=female), Race (1=white, 0=other) and Age are included as controls in the analysis (see Gottfredson and Hirschi, 1990:123-153).

Analysis

The analysis proceeds according to the following steps. First, we examine whether the attitudinal indicator of Low Self-Control significantly predicts Imprudent Behavior. This procedure allows us to determine whether the Low Self-Control scale has construct (and criterion) validity with Imprudent Behavior. Second, we compare the efficacy of predicting general crime with both the Low Self-Control and Imprudent Behavior Index. This allows us to differentiate between the relative effects of both methods of measuring low self-control. Finally, we evaluate which measure is more strongly predictive of general social outcomes, and whether Social Consequences might differentially mediate the effect of one or the other indicator of Low Self-Control on crime. Throughout the analysis we address the implications of testing the theory with these measures and also briefly compare our findings with those of Evans et al. (1997), since they included illegal conduct in their analogous behavior measure of Low Self-Control.

Findings

Model I in Table 3 reports the OLS results of the Imprudent Behavior Index regressed on Low Self-Control, while controlling for Gender, Age, and Race. (Due to space limitations, Pearson correlations are displayed in Appendix B). Model I reveals that the attitudinal indicator of Low Self-Control is a strong predictor of Imprudent Behavior (Beta = .259, $p < .001$). Consistent with Gottfredson and Hirschi's (1993:48) theoretical predictions, imprudent behavior (a measure designed to specifically exclude illegal conduct) seems to reflect the presence of low self-control and can be used to test the theory. At least for the authors, the use of such *legal*

Table 3. The Effects of Low Self-Control on Imprudent Behavior and Crime, and the Effects of the Imprudent Behavior Index on Crime (Betas Reported)*
(n = 390)

	Dependent variable					
	Model I		Model II		Model III	
	Imprudent behavior		Crime index		Crime index	
Low self-control	.259	(<.001)	.234	(<.001)	—	—
Male	.171	(<.001)	-.002	(.975)	-.016	(.749)
Age	-.264	(<.001)	-.237	(<.001)	-.206	(<.001)
White	.083	(.077)	.001	(.992)	-.009	(.885)
Imprudent behavior	—	—	—	—	.169	(.001)
R ²	.186	(<.001)	.119	(<.001)	.090	(<.001)

* This table approximates Evans et al.'s (1997) Table 1.

behavioral measures in tests of the theory can allow it to “survive” the charge of tautology.

Models II and III of Table 3 provide the results of a head-to-head comparison of the prediction power of both indicators of low self-control. As can be seen in the table, the attitudinal indicator of Low Self-Control predicts the Crime Index (Beta = .234, $p < .001$) better than Imprudent behavior predicts the Crime Index (Beta = .169, $p = .001$). Thus, the attitudinal indicator appears to be a stronger predictive measure for testing this portion of the theory. However, Imprudent Behavior does predict crime and, therefore, can be used as an indicator of Low Self-Control.

Even though the initial results appear to suggest that the attitudinal indicator is more strongly related to crime than Imprudent Behavior, we do not know whether the strength of the effects differ significantly. Therefore, we also conducted an R² comparison for the effects of the Low Self-Control scale and Imprudent Behavior on crime (Judd and McClelland, 1989:175-178). The test determines whether the R² in one model significantly differs from the R² in another model. In the first model, both indicators of low self-control are included as independent variables. In the second model, those two variables are replaced with their sum. The summed variable gets one coefficient, which is applied to both variables (i.e., the test is whether $bx + bz = b(x + z)$). If the model that applied the same coefficient to both variables significantly increases the R² over the model with two coefficients than the coefficients are significantly different. An F-test is then used to determine whether the R² for each of the models differ significantly.

The results of this test indicate that the R²s differ, but not significantly ($F^* = 1.385$; $p = >.05$).³ Therefore, our findings about the relative impact of attitudinal and

behavioral measures contrast with the findings of Evans and his colleagues. In Evans et al.'s (1997: 489) study the Analogous Behavior measure appeared to be a much stronger predictor of crime (Beta = .61) than their attitudinal indicator of Low Self-Control (Beta = .30). Although they did not conduct any empirical tests, as we do, one would surmise that the differences in the magnitude of the Betas would be significant, and in the opposite direction.

The major conclusion drawn from this comparison is that if analogous behavior measures include illegal activities they are stronger predictors of crime than are attitudinal indicators of low self-control. However, including illegal behaviors in such measures revives the charge of tautology (i.e., using crime to predict crime). When stripped of illegal behavior, Imprudent (Analogous) Behavior is not as efficacious in predicting crime, yet is still significant. The Imprudent Behavior measure has the distinct advantage of enabling researchers to test the theory, while circumventing the tautological criticism.

In Table 4, we compare the predictive powers of both measures of low self-control on other social outcomes. The first model examines the efficacy of predicting each of the Social Consequences dependent variables with the Low Self-Control attitudinal scale. The second model does the same with the Imprudent Behavior Index. Finally, Model III includes both measures of Low Self-Control.

As can be seen in the Table, across all three models both measures of low self-control are equally related to the Social Consequences variables (as in Evans et al.'s 1997 research). People with Low Self-Control are less likely to have quality friendships, are less satisfied with their life, are less likely to be married, fail to be involved in religious activities, and have lower educational attain-

Table 4. The Social Consequences of Low Self-Control, Controlling for Gender, Age, and Race (Betas Reported)*
(n = 391)

Dependent variables	Model I		Model II		Model III			
	Low self-control		Imrpudent behavior		LSC	+	ImpBeh	
Quality of friendships	-.082	(.103)	-.117	(.029)	-.056	(.281)	-.100	(.071)
Life satisfaction	-.154	(.002)	-.226	(<.001)	-.103	(.042)	-.196	(<.001)
Marital status **	-.243	(.023)	-.183	(.102)	-.212	(.055)	-.124	(.288)
Religious attendance **	-.218	(.100)	-.288	(.035)	-.157	(.258)	-.247	(.081)
Educational attainment	-.274	(<.001)	-.082	(.122)	-.273	(<.001)	-.003	(.958)
Income	-.039	(.425)	.089	(.086)	-.068	(.185)	.109	(.044)

* This table approximates Evans et al.'s (1997) Table 2.

** Marital status and religious attendance are both dichotomous variables (0 = No, 1 = Yes); the B is the log odds in logistic regression.

ment. In Model I, the attitudinal indicator has significant effects in three (50%) of the six equations. In Model II, Imprudent Behavior is also significant three times (50%). Out of the eighteen regression equations, the Low Self-Control measures (both attitudinal and behavioral) have significant effects nine times. Both of our measures, then, seem to have comparable effects on Social Consequences. These findings are consistent with the results found in the Evans et al. (1997) study.

Coupled with the findings reported above, our results suggest that excluding illegal conduct from analogous behavior measures decreases their ability to predict crime. However, it does not seem to reduce the ability to predict Social Consequences.

There is one finding in Model III that is in stark contrast to Gottfredson and Hirschi's (1990) theory; imprudent Behavior is significantly related to respondents' income in a theoretically unexpected direction (Beta = .109, p. = .044). One interpretation of this finding is that the use of outcome measures of low self-control to predict other outcome measures creates a causal ordering problem. The relationship suggests that engaging in Imprudent Behavior (a proposed reflection of low self-control) results in higher economic status. Viewed differently, it could be argued that the income one receives influences the type of (Imprudent) behavior in which an individual with low self-control engages. For instance, people with higher incomes have the opportunity to engage in short-term immediately gratifying behaviors that are not illegal (e.g., drinking and gambling), though such activities have potential distal consequences. Put another way, some imprudent behaviors require income, while others (and crime) may not. Thus, one's position in the social hierarchy may have more influence on the type of behavior an individual engages in than Gottfredson and Hirschi's (1990) theory suggests. This seemingly straight-

forward argument, however, is not without theoretical and methodological importance because it illustrates that the indicators selected to represent analogous behavior can influence the level of empirical support Gottfredson and Hirschi's (1990) theory receives.

Our final comparison of the relative effects of both of our measures of low self-control can be found in Table 5. This comparison also allows for a brief test of what Evans et al. (1997) call the "spurious thesis." This thesis states that self-control is responsible for the social consequences variables, as well as crime (as opposed to social consequences being determinants of involvement in crime). To test this contention we examine whether social factors continue to predict crime after both self-control measures are included in the equation. If not, the relationship between social consequences and crime is spurious and due to low self-control (Evans et al., 1997). Viewed from a different angle, we also use this test to determine if the attitudinal indicator of Low Self-Control remains a stronger predictor of crime than Imprudent Behavior, controlling for Social Consequences. In Column 1 the Social Consequences variables are regressed on Crime excluding measures of Low Self-Control. In Column 2 the attitudinal indicator of Low Self-Control is added into the initial equation. Column 3 is the same as the second equation with the exception that Imprudent Behavior is the indicator of low self-control. Finally, in the last equation both measures of low self-control are included. The last model allows us to conduct our final comparison of the predictive power of each measure on crime (controlling for Social Consequences), as well as to test the "spurious thesis."

There are several important findings in Table 5. First, the Social Consequences variables are relatively weak predictors of crime (see Model I). In fact, only Life Satisfaction and Marital Status have significant effects

Table 5. The Impact of Low Self-Control on Crime, Controlling for Gender, Age, and Race (Betas Reported)*

(n = 390)

	No measure of self control		Low self-control		Imprudent behavior		Both measures of self-control	
Low self-control	—	—	.197	(<.001)	—	—	.179	(<.001)
Imprudent behavior	—	—	—	—	.129	(.016)	.087	(.108)
Quality of friendships	-.047	(.351)	-.032	(.513)	-.037	(.453)	-.027	(.579)
Life satisfaction	-.110	(.033)	-.088	(.083)	-.085	(.102)	-.074	(.153)
Marital status (1 = married)	-.156	(.002)	-.141	(.005)	-.151	(.003)	-.139	(.005)
Religious attendance	-.048	(.332)	-.033	(.506)	-.035	(.481)	-.025	(.609)
Educational attainment	-.056	(.281)	.000	(.999)	-.044	(.399)	.003	(.953)
Income	-.027	(.615)	-.039	(.453)	-.044	(.407)	-.050	(.343)
R ²	.121	(<.001)	.155	(<.001)	.134	(<.001)	.161	(<.001)

* This table approximates Evans et al.'s (1997) Table 3.

Note: Income is recoded so that missing equals the mean.

(33% of the equations). This is consistent with the study by Evans and his colleagues (1997), which found that only 3 (23%) of their 13 social consequences measures were significant in a similar equation. Therefore, the Social Consequences variables are relatively weak predictors of crime.

Second, one of the social consequences variables, marital status, is not reduced to insignificance in the final equation. Married respondents reported lower levels of involvement in crime, after controlling for their level of Low Self-Control. This could be the product of the social bond produced between married individuals, which could lengthen the time frame use in the calculus before committing crime (see Sampson and Laub, 1993:140-143 for an in-depth discussion of "attachment to spouse") or simply because being married might limit the number of criminal opportunities available. Whatever the case, this finding seems to challenge the "persistent heterogeneity" argument found in Gottfredson and Hirschi's (1990) theory because it suggests that later life course events might inhibit crime (Sampson and Laub, 1993).

Finally, the Low Self-Control Scale is significant in the second column (Beta = .197, $p < .001$) and the Imprudent Behavior Index is significant in the third (Beta = .129, $p = .016$), controlling for the Social Consequences variables. This demonstrates that the Social Consequences variables do not mediate much of the effects of either measure. In the fourth column, however, the effect of the Imprudent Behavior Index is reduced to insignificance (Beta = .087, $p = .108$) once the attitudinal indicator (Beta = .179, $p < .001$) is included in the last equation. Therefore, the relationship between Imprudent Behavior and Crime is spurious and due to Low Self-Control.⁴ Put differently, the attitudinal indicator of Low Self-Control is not only

a strong predictor of crime but it is also responsible for imprudent behavior.

Discussion

Our results suggest several conclusions. First, behaviors that provide immediate short-term benefits, but also have distal consequences; i.e., imprudent behaviors, can be used to test Gottfredson and Hirschi's general theory of crime (Hirschi and Gottfredson, 1993). Therefore, we would recommend excluding illegal behavior in such measures. This method of operationalization *reduces* the tautological criticism aimed at the theory but does not eliminate it because low self-control is also responsible for imprudent behavior. Therefore, using an outcome of low self-control to predict other outcomes of low self-control can still be viewed as somewhat tautological (Paternoster and Brame, 1998). Second, attitudinal indicators of low self-control can also be used to test the theory, as previous research demonstrates. Third, our attitudinal indicator was a superior measure relative to imprudent behavior in terms of predicting crime; though this finding may reflect the types of imprudent behaviors included in our behavioral measures (see Tittle et al., 2003a). Fourth, both indicators were just as efficacious in explaining other social consequences, which, in turn, did not mediate the effects of either self-control measure on crime. Regardless of the measure used, low self-control is a stronger predictor of crime than later life course influences, which is very consistent with Gottfredson and Hirschi's (1990) theory. In our analysis, however, there was one exception to this general tendency. Being married was associated with a significantly lower involvement in crime, which suggests that some later life course

events might reduce the possibility of crime (Sampson and Laub, 1993; and see Andrews et al., 1990; Gendreau, Little, and Goggin, 1996).

Finally, and perhaps most importantly, we draw different conclusions than both Evans and his associates (1997) and Tittle and his colleagues (2003a) about the relative predictive power of attitudinal and behavioral indicators. Our analysis, viewed in conjunction with the findings of Evans and his colleagues (1997), demonstrates that while analogous behaviors may be stronger predictors of crime when they include illegal activities, stripping them of such indicators reduces their efficacy. Our conclusion, therefore, is also contrary to Tittle et al.'s (2003a) assertion that it would seem to matter little whether researchers use (or have used) behavioral or attitudinal indicators of low self-control to predict involvement in crime or deviance. We believe it matters a great deal as to how the behavioral indicators are operationally defined. In this regard, however, one of our more surprising findings appears to be that our behavioral indicator of low self-control does not appear to be a stronger predictor of involvement in crime (which we thought it would) relative to the different measures used by Tittle et al. (2003a). This may be due to the fact that the imprudent behaviors that we had at our disposal were simply yes/no items rather than measures of intensity of imprudence. Future research should more closely examine different types and degrees of involvement in imprudent behavior and their relationship with crime and other social consequences.

As we have discussed, our test of Gottfredson and Hirschi's (1990) theory partially replicated the study conducted by Evans et al. (1997), although we specifically attempted to remove illegal behaviors from our measure. We do understand their justification for including drug offenses as indicators of low self-control. As Evans and colleagues (1997:484) point out that "as largely public order violations, (their items) seem to fall outside Gottfredson and Hirschi's (1990:15) definition of crime 'as acts of force or fraud undertaken in the pursuit of self-interest.' That is, they do not fall under the rubric of 'ordinary crimes'—essentially theft and violent offenses—discussed by Gottfredson and Hirschi." In fact, some might argue that it is not even tautological at all to use illegal activities as a behavioral indicator of low self-control as long as these indicators do not use "force" or "fraud" because those types of (criminal) activities fall outside of Gottfredson and Hirschi's (1990) discussion of crime. While this is true, to some extent, it is important to remind ourselves that Gottfredson and Hirschi (1990:117) are trying to use the concept of low self-control to "... explain all crime, at all times." Therefore, they allow for a

more expansive definition of crime—not just one limited by force or fraud. Because of this, we believe that even the use of these types of crimes in empirical tests *is* tautological.

Furthermore, our reading of the Evans et al. (1997) study led us to believe that other researchers might view illegal analogous behaviors as preferable in tests of the theory (see Pratt and Cullen, 2000), which might lead to a decreased use of attitudinal indicators (but see Tittle et al., 2003a). From our perspective, this strategy may strengthen the tautological criticism. For example, this type of procedure seems to invite the same criticism that was once leveled against the Psychopathic Deviate subscale of the Minnesota Multiphasic Personality Inventory (MMPI) and the Socialization subscale of the California Personality Inventory (CPI). Gottfredson and Hirschi (1990:109), in fact, seem to almost solicit such a critique when they quote Wilson and Herrnstein's (1985:187) observation that the Psychopathic Deviate subscale includes "questions about a respondent's past criminal behavior," and then go on to argue that "if this is so, then scale scores obviously cannot be used to establish the existence of a trait of personality independent of the tendency to commit criminal acts" (Gottfredson and Hirschi, 1990:109). The same, they continue, can be said about the Socialization subscale of the CPI which uses items that are "indistinguishable from standard self-report delinquency items" (Gottfredson and Hirschi, 1990:109-110). Therefore, Gottfredson and Hirschi's (1990) own argument seems to suggest that the inclusion of criminal behaviors in "analogous" measures of low self-control is at least as tautological as the use of these instruments.

In hindsight, however, we must acknowledge that we are potentially, though to a lesser extent, guilty of the same thing; i.e., if one looks closely, the proposed legality of some of our measures might also be questioned. For example, our sample included young adults that may have consumed alcoholic beverages but were not yet of a legal age to do so, and not using a seat belt *is* an offense that individuals may be cited for. In addition, some of the other behaviors included in our imprudent behavior measure are prohibited in some areas or have been defined as a violation of the law in the past (and perhaps will be in the future). Smoking, for example, is currently prohibited in certain areas (e.g., planes, certain buildings, etc.), gambling is outlawed in some jurisdictions (though not where our respondents came from), and drinking alcohol was made illegal during Prohibition. Hence, to a certain extent, some of our indicators of imprudent behavior can be seen as reflective of the (illegal) analogous behaviors that we discussed.

So, where do we go from here? One additional area of interest would be to test the theory with self-reported imprudent behavioral measures that are derived early in an individual's life. This would be beneficial for two reasons. First, this procedure solves the causal ordering problem. Behavioral indicators of low self-control can be measured prior to the respondent's involvement in delinquency or crime (see Hirschi and Gottfredson, 1993). Second, the use of (imprudent) behavioral measures, as mentioned, reduces the tautological criticism aimed at the theory. Hirschi and Gottfredson (1993:48) "have proposed (using) such items as whining, pushing, and shoving (as a child); smoking and drinking and excessive television watching and accident frequency (as a teenager); difficulties in interpersonal relationships, employment instability, automobile accidents, drinking, and smoking (as an adult)," as examples of behaviors indicative of low self-control. They further argue that "none of these acts or behaviors is a crime. They are logically independent of crime. Therefore the relation between them and crime is not a matter of definition, and the theory survives the charges that it is mere tautology and that it is nonfalsifiable" (Hirschi and Gottfredson, 1993:51).

As with any procedure that brings with it advantages, however, so follow the potential drawbacks. While some might argue that a number of these activities are illegal (e.g., pushing and shoving as a child, and smoking and drinking as a teenager), what is equally problematic is that there is no definitive basis for concluding that such behaviors are the sole product of "low self-control." To be sure, scales designed to measure low self-control do predict these types of analogous behaviors, as we have seen in our analysis; so they can tentatively be used to test the theory. One should keep in mind, however, that no research to date has compared the theory of low self-control head-to-head with other theories to determine if it is the only cause of "analogous" behavior.

In fact, without an explicit operational definition of low self-control, as conceptualized by Gottfredson and Hirschi (1990), there are a number of alternative theories that are potentially tenable as explanations for these behavioral outcomes, and therefore the use of analogous (imprudent) behaviors in empirical tests still maintains, to a certain extent, the tautological criticism. It may be intellectually interesting to use proposed outcomes of self-control (e.g., analogous behaviors) to predict other outcomes (e.g., crime), but such a procedure seems to lack much meaningful scientific rigor as to whether "low self-control" is actually the sole causal agent of interest in such "tests." This contention, therefore, seems to bring us back full circle to reconsidering how to opera-

tionalize low self-control without using one or more of its proposed outcomes in empirical analyses. Seemingly, it leads to the conclusion that measures, other than those that are behavioral, that tap the characteristics of crime and the characteristics of offenders, can be viewed as less tautological indicators of low self-control for tests of the theory. Therefore, attitudinal indicators of low self-control can help to reveal whether something akin to low self-control, as conceptualized by Gottfredson and Hirschi (1990), actually exists. Furthermore, such measures can help to reveal just how powerful Gottfredson and Hirschi's (1990) theory is in comparison with other explanations for crime, because the actual concept of low self-control is being operationalized. Finally, attitudinal indicators of low self-control can eliminate the criticism of tautology, and therefore allows the theory to survive as an explanation of crime.

Endnotes

1. It is important to point out that these are not the same data that were used in the Tittle et al. (2003a) study. Tittle et al. used data derived from a completely different sample during a different year. Rather, the data analyzed in this research are the same data that have been used in some of the more widely cited studies testing various propositions found in Gottfredson and Hirschi's (1990) theory (e.g., Grasmick et al., 1993; Arneklev et al., 1993).

2. During our deliberations as to which concepts to include as reflections of positive social outcomes (as well as how they should be operationally defined) we paid close attention to Evans et al.'s (1997:480) study and attempted to tap as many of the "social consequences" factors that they used in their research.

3. The difference in coefficients is determined by:

$$\begin{aligned} \text{PRE} &= 1 - \frac{[\text{Sum of Squares (Residual) LSCandImp.B.}]}{[\text{Sum of Squares (Residual) LSC + Imp.B.}]} = 1 - \frac{268.961}{269.931} = .0035 \\ F^* &= \frac{\text{PRE}/1}{(1-\text{PRE})/(n-6)} = \frac{.0035936/1}{(1-.0035936)/(390-6)} \\ &= \frac{.0035936}{(.9964064/384)} = \frac{.0035936}{.0025948} = 1.3849237 \quad (p \geq .05) \end{aligned}$$

4. The "spurious thesis" suggested by Evans et al. (1997) can only be made if one assumes a certain time/causal ordering between the indicators. If this assumption cannot be made, then researchers should be looking at independent rather than causal effects.

References

- Akers, Ronald L. 1991. "Self-Control as a General Theory of Crime." *Journal of Quantitative Criminology* 7:201-211.
- Andrews, D. A., Ivan Zinger, Robert D. Hoge, James Bonta, Paul Gendreau, and Francis T. Cullen. 1990. "Does Correctional Treatment Work? A Clinical Relevant and Psychologically Informed Meta-Analysis." *Criminology* 28:369-397.
- Arneklev, Bruce J., John K. Cochran, and Randy R. Gainey. 1998. "Testing Gottfredson and Hirschi's 'Low Self-Control' Stability Hypothesis: An Exploratory Study." *American Journal of Criminal Justice* 23:107-127.
- Arneklev, Bruce J., Harold G. Grasmick, Charles R. Tittle, and Robert J. Bursik, Jr. 1993. "Low Self-Control and Imprudent Behavior." *Journal of Quantitative Criminology* 9:225-247.
- Arneklev, Bruce J., Harold G. Grasmick, and Robert J. Bursik, Jr. 1999. "Evaluating the Dimensionality and Invariance of 'Low Self-Control'." *Journal of Quantitative Criminology* 15: 307-331.
- Bolin, Aaron U. 2004. "Self-Control, Perceived Opportunity, and Attitudes as Predictors of Academic Dishonesty." *Journal of Psychology* 138:101-114.
- Barlow, Hugh D. 1991. "Explaining Crime and Analogous Acts, or the Unrestrained Will Grab at Pleasure Whenever They Can." *Journal of Criminal Law and Criminology* 82:229-242.
- Brannigan, Augustine, William Gemmell, David J. Pevalin, and Terrance J. Wade. 2002. "Self-Control and Social Control in Childhood Misconduct and Aggression: The Role of Family Structure, Hyperactivity, and Hostile Parenting." *Canadian Journal of Criminology* 44:119-142.
- Brownfield, David and Ann Marie Sorenson. 1993. "Self-Control and Juvenile Delinquency: Theoretical Issues and an Empirical Assessment of Selected Elements of a General Theory of Crime." *Deviant Behavior* 14:243-264.
- Cochran, John K., Peter B. Wood, Christine S. Sellers, Wendy Wilkerson, and Mitchell B. Chamlin. 1998. "Academic Dishonesty and Low Self-Control: An Empirical Test of a General Theory of Crime." *Deviant Behavior* 14:243-264.
- DeLisi, Matt. 2001. "Designed to Fail: Self-Control and Involvement in the Criminal Justice System." *American Journal of Criminal Justice* 26:131-148.
- DeLisi, Matt, Andy Hochstetler, and Daniel S. Murphy. 2003. "Self-Control Behind Bars: A Validation Study of the Grasmick et al., Scale." *Justice Quarterly* 20:242-263.
- Evans, T. David, Francis T. Cullen, Velmer S. Burton, Jr., R. Gregory Dunaway, and Michael L. Benson. 1997. "The Social Consequences of Self-Control: Testing the General Theory of Crime." *Criminology* 5:475-501.
- Gendreau, Paul, Tracy Little, and Claire Goggin. 1996. "A Meta-Analysis of the Predictors of Adult Offender Recidivism: What Works!" *Criminology* 34:575-607.
- Geis, Gilbert. 2000. "On the Absence of Self-Control as the Basis for a General Theory of Crime: A Critique." *Theoretical Criminology* 4:35-52.
- Gibbs, John J., Dennis Giever, and Jamie S. Martin. 1998. "Parental Management and Self-Control: An Empirical Test of Gottfredson and Hirschi's General Theory." *Journal of Research in Crime and Delinquency* 35:40-70.
- Gibson, Chris and John Wright. 2001. "Low Self-Control and Coworker Delinquency: A Research Note." *Journal of Criminal Justice* 29:483-492.
- Gottfredson, Michael R. and Travis Hirschi. 1990. *A General Theory of Crime*. Stanford, CA: Stanford University Press.
- Grasmick, Harold G., Charles R. Tittle, Robert J. Bursik, Jr., and Bruce J. Arneklev. 1993. "Testing the Core Empirical Implications of Gottfredson and Hirschi's General Theory of Crime." *Journal of Research in Crime and Delinquency* 30:5-29.
- Hay, Carter. 2001. "Parenting, Self-Control, and Delinquency: A Test of Self-Control Theory." *Criminology* 39:707-736.
- Hindelang, Michael, Travis Hirschi, and Joseph G. Weis. 1981. *Measuring Delinquency*. Beverly Hills, CA: University of California Press.

- Hirschi, Travis. 1986. "On the Compatibility of Rational Choice and Social Control Theories of Crime." Pp. 105-118 in *The Reasoning Criminal*, edited by D. Cornish and R.V. Clarke. New York: Springer-Verlag.
- Hirschi, Travis and Michael Gottfredson. 1993. "Commentary: Testing the General Theory of Crime." *Journal of Research in Crime and Delinquency* 30:47-54.
- Hirschi, Travis and Michael Gottfredson. 1995. "Control Theory and the Life-Course Perspective." *Studies of Crime & Crime Prevention* 4:131-142.
- Jones, Shayne and Neil Quisenberry. 2004. "The General Theory of Crime: How General Is it?" *Deviant Behavior* 25: 401-426.
- Keane, Carl, Paul S. Maxim, and James J. Teevan. 1993. "Drinking and Driving, Self-Control and Gender: Testing a General Theory of Crime." *Journal of Research in Crime and Delinquency* 30:30-46.
- LaGrange, Teresa C. and Robert A. Silverman. 1999. "Low Self-Control and Opportunity: Testing the General Theory of Crime as an Explanation for Gender Differences in Delinquency." *Criminology* 37:41-71.
- Longshore, Douglas, Susan Turner, and Judith A. Stein. 1996. "Self-Control in a Criminal Sample: An Examination of Construct Validity." *Criminology* 34:209-228.
- Marcus, Bernd. 2004. "Self-Control in the General Theory of Crime: Theoretical Implications of a Measurement Problem." *Theoretical Criminology* 8:33-55.
- Nagin, Daniel S. and David P. Farrington. 1992. "The Stability and Criminal Potential from Childhood to Adulthood." *Criminology* 30:163-189.
- Nagin, Daniel S. and Kenneth C. Land. 1993. "Age, Criminal Careers, and Population Heterogeneity: Specification and Estimation of a Nonparametric, Mixed Poisson Model." *Criminology* 31:327-362.
- Nagin, Daniel S. and Raymond Paternoster. 1991. "On the Relationship of Past to Future Participation in Delinquency." *Criminology* 29:163-189.
- Nagin, Daniel S. and Raymond Paternoster. 1993. "Enduring Individual Differences and Rational Choice Theories of Crime." *Law & Society Review* 27:467-496.
- Nagin, Daniel S. and Douglas A. Smith. 1990. "Participation in and Frequency of Delinquent Behavior: A Test for Structural Differences." *Journal of Quantitative Criminology* 6:335-356.
- Paternoster, Raymond and Robert Brame. 1998. "The Structural Similarity of Processes Generating Criminal and Analogous Behaviors." *Criminology* 36:633-666.
- Peter, Tracey, Teresa C. LaGrange, and Robert A. Silverman. 2003. "Investigating the Interdependence of Strain and Self-Control." *Canadian Journal of Criminology and Criminal Justice* 45:431-464.
- Piquero, Alex R. and Stephen Tibbetts. 1996. "Specifying the Direct and Indirect Effects of Low Self-Control and Situational Factors in Offenders' Decision Making: Toward a More Complete Model of Rational Offending." *Justice Quarterly* 13:481-510.
- Piquero, Alex R. and Andre B. Rosay. 1998. "The Reliability and Validity of Grasmick et al.'s Self-Control Scale: A Comment on Longshore et al." *Criminology* 36:157-173.
- Polakowski, Michael. 1994. "Linking Self and Social Control with Deviance: Illuminating the Structure Underlying A General Theory of Crime and Its Relation to Deviant Activity." *Journal of Quantitative Criminology* 10:41-78.
- Pratt, Travis C. and Francis T. Cullen. 2000. "The Empirical Status of Gottfredson and Hirschi's General Theory of Crime: A Meta-Analysis." *Criminology* 38:931-964.
- Sampson, Robert J. and John H. Laub. 1993. *Crime in the Making: Pathways and Turning Points Through life*. Cambridge, MASS: Harvard University Press.
- Tittle, Charles R. 1991. "A General Theory of Crime: A Book Review." *American Journal of Sociology* 96:1609-1611.
- Tittle, Charles R., David A. Ward, and Harold G. Grasmick. 2003a. "Self-Control and Crime/Deviance: Cognitive vs. Behavioral Measures." *Journal of Quantitative Criminology* 19:333-365.

- Tittle, Charles R., David A. Ward, and Harold G. Grasmick. 2003b. "Gender, Age, and Crime/Deviance: A Challenge to Self-Control Theory." *Journal of Research in Crime and Delinquency* 40:426-453.
- Tittle, Charles R., David A. Ward, and Harold G. Grasmick. 2004. "Capacity for Self-Control and Individuals' Interest in Exercising Self-Control." *Journal of Quantitative Criminology* 20:143-172.
- Turner, Michael G. and Alex R. Piquero. 2002. "The Stability of Self-Control." *Journal of Criminal Justice* 30:457-471.
- Unnever, James D., Francis T. Cullen, and Travis C. Pratt. 2003. "Parental Management, ADHD, and Delinquent Involvement: Reassessing Gottfredson and Hirschi's General Theory." *Justice Quarterly* 20:471-500.
- Vazsonyi, Alexander T., Lloyd E. Pickering, Marianne Junger, and Dick Hessing. 2001. "An Empirical Test of a General Theory of Crime: A Four-Nation Comparative Study of Self-Control and the Prediction of Deviance." *Journal of Research in Crime and Delinquency* 38:91-131.
- Vazsonyi, Alexander T. and Jennifer M. Crosswhite. 2004. "A Test of Gottfredson and Hirschi's General Theory of Crime in African American Adolescents." *Journal of Research in Crime and Delinquency* 41:407-432.
- Vazsonyi, Alexander T., Janice E. Clifford Wittekind, Lara M. Belliston, and Timothy D. Van Loh. 2004. "Extending the General Theory of Crime to 'The East:' Low Self-Control in Japanese Late Adolescents." *Journal of Quantitative Criminology* 20:189-216.
- Wiebe, Richard P. 2003. "Reconciling Psychopathy and Low Self-Control." *Justice Quarterly* 20:297-335.
- Wilson, James Q. and Richard Herrnstein. 1985. *Crime and Human Nature: The Definitive Causes of Crime*. New York: Simon and Schuster.
- Wood, Peter B., Betty Pfefferbaum, and Bruce J. Arneklev. 1993. "Risk-Taking and Self-Control: Social Psychological Correlates of Delinquency." *Journal of Crime & Justice* 16:111-130.
- Wright, Bradley R. Entner, Avshalom Capsi, Terrie E. Moffitt, and Phil A. Silva. 1999. "Low Self-Control, Social Bonds, and Crime: Social Causation, Social Selections, or Both?" *Criminology* 37:479-514.

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Appendix A. Imprudent Behavior, Crime, and Social Consequences Items

Imprudent Behavior Items*

- Do you smoke tobacco products? **(Smoke)**
- Do you usually drink more than two or three alcoholic beverages over the span of a week? **(Drink)**
- Do you pretty much eat what you feel like eating without being concerned with how it affects your health? **(Eat)**
- When you are in an automobile, do you always use the seat belt? **(Seat Belt)**
- Do you now and then like to gamble? **(Gamble)**
- During the past year, have you been in an accident or injured yourself so severely that you had to see a doctor? **(Accident)**

Crime Measures

- How many times in the past five years have you used or threatened to use force against an adult to accomplish your goals? **(Force)**
- How many times in the past five years have you distorted the truth or falsely represented something to get something you couldn't otherwise obtain? **(Fraud)**
- How many times in the past five years have you taken something worth less than \$20 that did not belong to you? **(Theft)**
- How many times in the past five years have you taken something worth at least \$100 that did not belong to you? **(Grand Theft)**

Social Consequences Measures

Friends**

- Now thinking of the people whom you interact with most often, not counting those you live with – people like friends, neighbors, or relatives. Please answer the next three items in terms of your relationships with these people.
- On the average, my relationships with these people are very close. I often share my inner-most thoughts and feelings with them.
- When I need help, I can turn to these people.

Religious Attendance*

- Do you ever attend church, watch church services on television, or listen to church services on the radio?

Income

- How much income did you personally earn from all sources last year?

Life Satisfaction**

- In most ways my life is close to my ideal.
- The conditions of my life are excellent.
- I am satisfied with my life.
- So far I have gotten the important things I want in life.

* The response categories are: 1) Yes, 0) No.

** The response categories are: 4) Strongly agree, 3) Agree somewhat, 2) Disagree somewhat, 1) Strongly disagree.

Appendix B. Correlations Among the Low Self-Control Scale, Imprudent Behavior Index, Self-Reported Crimes, Crime Index and Control Variables

One-tailed tests of significance in parentheses.
(n = 390)

	Low self-control	Imprudent behavior	Force	Fraud	Theft	Grand theft	Crime index	Male	Age	White
Low self-control	1.000									
Imprudent behavior (<.001)	.293	1.000								
Force	.160 (.001)	.102 (.022)	1.000							
Fraud	.261 (<.001)	.250 (<.001)	.387 (<.001)	1.000						
Theft	.140 (.003)	.124 (.007)	.221 (<.001)	.384 (<.001)	1.000					
Grand theft	.139 (.003)	.171 (<.001)	.480 (<.001)	.367 (<.001)	.419 (<.001)	1.000				
Crime index (<.001)	.251 (<.001)	.223 (<.001)	.715 (<.001)	.781 (<.001)	.673 (<.001)	.723 (<.001)	1.000			
Male	.073 (.060)	.199 (<.001)	-.107 (.017)	.030 (.279)	.118 (.010)	.044 (.195)	.025 (.310)	1.000		
Age	-.073 (.074)	-.276 (<.001)	-.110 (.015)	-.207 (<.001)	-.269 (<.001)	-.119 (.009)	-.254 (<.001)	-.035 (.247)	1.000	
White	-.010 (.418)	.040 (.215)	.014 (.393)	-.026 (.306)	-.020 (.348)	-.062 (.112)	-.035 (.248)	-.024 (.320)	.158 (.001)	1.000