Deviant Behavior
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/udbh20

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Version of record first published: 30 Jan 2013.

To cite this article: Scott A. Desmond , Jeffery T. Ulmer & Christopher D. Bader (2013): Religion, Self Control, and Substance Use, Deviant Behavior, 34:5, 384-406

To link to this article: http://dx.doi.org/10.1080/01639625.2012.726170

Deviant Behavior, 34: 384–406, 2013

ISSN: 0163-9625 print / 1521-0456 online
DOI: 10.1080/01639625.2012.726170

Routledge
Taylor & Francis Group

Religion, Self Control, and Substance Use

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Previous research has examined a number of mechanisms through which religion might have an indirect influence on substance use. One potential intervening mechanism that has received little empirical attention is self control. Using data from the National Longitudinal Study of Adolescent Health (Add Health) we (1) examine the association between religion and self control, (2) determine if self control mediates the effect of religiosity on substance use, and (3) determine if the effect of self control on substance use varies depending on adolescents' religiosity. The results suggest that religious youth exhibit higher levels of self control. Also, self control partially mediates the effect of adolescents' religiosity on marijuana use and drinking. The only evidence we find for an interaction between self control and religiosity suggests self control has a moderately greater effect on alcohol use among those of low, rather than medium or high, religiosity.

Although Gottfredson and Hirchi's (1990) work has reinvigorated the concept, serious interest in self control among criminologists extends at least back to the 1950s (see the review by Hay 2001). For example, Walter Reckless (1967) emphasizes not only ''outer containment'' but ''inner containment,'' which he identifies with individuals' moral consciences along with the strength of their self concepts. Albert Reiss (1951) speaks of ''personal controls'' and Ivan Nye (1958) emphasizes ''internalized control.'' In addition, a substantial psychological literature

Received 9 January 2012; accepted 20 May 2012.

This research uses data from the National Longitudinal Study of Adolescent Health (Add Health), a project designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris, and funded by a grant P01-HD31921 from the National Institute of Child Health and Human Development, with cooperative funding from 17 other agencies. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Persons interested in obtaining data files from Add Health should contact Add Health, Carolina Population Center, 123 W. Franklin Street, Chapel Hill, NC 27516-2524. This research was supported by a grant from the Office of Juvenile Justice and Delinquency Prevention (2006-JF-FX–0072). We are grateful to Sung Joon Jang and Byron Johnson for comments and suggestions on earlier drafts of this article.

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on self control shows it to be important in a variety of behaviors (see, e.g., Geyer and Baumeister 2005; McCullough and Willoughby 2009; Muraven et al. 2006; Vazsonyi and Jenkins 2010).

The relationships between religious variables, self control, and behavior remain seriously under-researched in both sociology and psychology (McCullough and Willoughby 2009).[1] We examine the extent to which adolescents' religion, measured at one time, predicts variation in later measures of adolescents' self control. We then assess the direct effects of these measures of religion and self control on marijuana and alcohol use. We are particularly interested in the degree to which self control mediates the effect of adolescents' religiosity on substance use. Finally, we examine the extent to which religiosity interacts with self control in relation to marijuana and alcohol use. In summary, we attempt to answer three interrelated questions about the relationships between religion, self control, and substance use: does religion affect self control, does self control mediate the effect of religion on substance use, and does religion condition the effect of self control on substance use?

THEORETICAL EXPECTATIONS

Self Control

Perhaps the best-known treatment of self control and deviance is Gottfredson and Hirschi's (1990). Gottfredson and Hirschi argue that crime and ''analogous behaviors'' (deviant behaviors that resemble crime) are the result of low self control, coupled with criminal opportunity. Further, they argue that: (1) self control largely comes from parental discipline in childhood, (2) absolute levels of self control can change throughout the life course with natural cognitive aging and responsibility, but (3) one's relative level of self control compared to others' is largely determined by about age 11–12.[2]

However, religious socialization and exposure to religious activities would seem to be a potentially important process by which self control could be developed and increased. Indeed, evidence and theory suggest that self control should be pervious to religious influence (Laird et al. 2011; McCullough and Willoughby 2009; Vazsonyi and Jenkins 2010; Walker et al. 2007), even after the late childhood/early adolescence period posited by Gottfredson and Hirschi to be the point at which one's relative self control stabilizes. Some scholars have moved away from treating self control as a stable individual trait to treating it as a dynamic capacity that is conditioned by social environmental factors, such as prior self control depletion, moral beliefs and choice, or community characteristics (Arneklev et al. 1998; Muraven et al. 2006; Piquero

[1]We use the term ''religion'' as a broad category that includes a variety of religious attitudes and behaviors (e.g., religious literalism, born-again Christian, and religious affiliation). In contrast, we use the term ''religiosity'' more narrowly to refer to the degree of religious salience and involvement (e.g., attendance at religious services, importance of religion, and frequency of prayer).

[2]Hirschi (2004) has recently sought to improve on and address criticism of the Gottfredson and Hirschi (1990) treatment of self control. This new treatment of self control has, in turn, been extended by Piquero and Buffard (2007). Self control is now defined by Hirschi (2004:543) as ''the tendency to consider the full range of potential costs of a particular act...'' and as ''the set of inhibitions one carries with one wherever one happens to go.'' He suggests the four elements of the social bond he described in 1969 produce such inhibitions and care for the costs of deviance. This new treatment of self control by Hirschi still posits that both self and social control are established early in life and that relative differences between individuals in them are relatively stable across the life course.

and Buffard 2007; Teasdale and Silver 2009; Tittle et al. 2004; Wikstrom and Treiber 2007). By implication, adolescents' self control might be affected by their parents' and their own religion (Geyer and Baumeister 2005; McCullough and Willoughby 2009; Vazsonyi and Jenkins 2010). Religion could thus strengthen self control.

Hay and Forrest (2006:740) note that ''little is known about the process by which [self control] develops over time.'' Latimore et al. (2006:348) note that only a small handful of studies address predictors of self control, and ''additional information concerning the sources of self control are therefore needed.'' They theorize that a key source might be moral messages from caregivers and others. Cochran et al. (1998) find that parental attachment contributes to higher self control. Hay and Forrest (2006) find moderate stability in absolute self control and between-individual differences in self control, but they also find that between-individual differences in self control were affected by parental socialization well into adolescence.[3] Pratt et al. (2004) find that both parental socialization and neighborhood conditions predict variation in self control. They argue that community-level control and socialization is equally important as parenting in contributing to the development of self control. These suggestions of malleability of self control past childhood imply that participation in religion might strengthen self control.

Does Religion Affect Self Control?

Psychologists have developed a ''muscle'' or ''strength'' model of self control (Muraven et al. 1998), arguing that self control is a cognitive resource that is temporarily depleted whenever it is exercised, just as a muscle is temporarily fatigued when it is used. Research by Muraven et al. (2006) and others (e.g., Muraven et al. 1998) supports a muscle model of self control, finding that base levels of self control and self control depletion independently predicted student cheating. This model also implies that self control should grow stronger with regular ''exercise'': repeated efforts at self control should make one's self control stronger over time (Muraven et al. 1998).

Geyer and Baumeister (2005:418) argue that ''Religious organizations, as an external source of discipline, can be very helpful to people's personal self control endeavors.'' In other words, religion may fortify this psychological muscle of self control by encouraging its repeated use in everyday life. Relatedly, Latimore et al. (2006) argue that self control rests largely on internalized moral principles that are enforced by guilt and painful emotions. Religion likely fosters what Geyer and Baumeister (2005) call the three main elements in the operation of self control: (1) it fosters internalization of behavioral standards, (2) it fosters self monitoring, and (3) it exhorts individuals to control or alter their own behavior. In sum, they argue (Geyer and Baumeister 2005:430):

[3]Gottfredson and Hirschi (1990) say that *between-individual differences* in self control stabilize after late childhood (see Hay and Forrest 2006). However, even this leaves open the possibility that religion might increase an individual's *absolute* levels of self control, even if it might not equalize stable differences between individuals. For example, imagine two religious adolescents: one with higher self control and one with lower self control. Religion might augment the absolute self control of both individuals, such that both develop greater self control than they would have without religion's influence, but the relative difference between them would remain the same.

> Religion may promote self control by upholding specific moral standards, by motivating people to want to be good, by exploiting the prosocial power of guilt, by linking the religious individual to a stable network of relationships with other believers and with God, by promoting character strength through regular exercise of moral muscle, by fostering self criticism, and by making people feel that their good and bad deeds are being observed and recorded.

Using data from a 1994 cross-sectional survey of adults in Oklahoma City, Welch et al. (2006) addressed whether religious people have greater self control, whether self control renders any relationship between religiosity and self reported projected minor deviance spurious, and whether religiosity and self control interact. They found that religiosity exhibited a significant positive association with self control. In addition, a systematic review of literature by McCullough and Willoughby (2009) found substantial empirical support for the proposition that religion promotes self control. Thus, we examine the relationship between religious factors, particularly religiosity, and self control. Drawing from the discussion above, then, we test our first main hypothesis:

> H_1: Adolescents' religiosity in earlier adolescence will be positively associated with later self control.

Does Self Control Mediate the Effect of Religion on Substance Use?

A growing body of research suggests that youth exposure to religious activities is a potential inhibitor of juvenile delinquency. For example, adolescent religiosity is inversely related to substance use, skipping school, fighting, and violent and non-violent crime (Chitwood et al. 2008; Desmond et al. 2010; Hill et al. 2009; Johnson and Jang 2010; Spivak et al. 2010; Ulmer 2010). In addition, religious conversion or increases in religious belief have been identified as factors in desistence from crime (Laub and Sampson 2003). Religiosity also appears to insulate youth from the criminogenic influences of socially disorganized neighborhoods (Jang and Johnson 2001) and delinquent peers (Desmond et al. 2011).

Although Gottfredson and Hirschi (1990) argue that self control (coupled with opportunity) is the only factor necessary for explaining deviant behavior, several recent studies view self control as one factor among several key influences affecting crime and delinquency (e.g., Muraven et al. 2006; Pratt and Cullen 2000; Tittle and Botchkovar 2005; Tittle et al. 2004; Wikstrom and Treiber 2007). Self control has been consistently linked to delinquency and other deviant behavior, though the strength of the relationship is typically modest, and it typically does not render spurious the effects of other key factors, such as deviant peer association and pro-criminal/delinquent learning, conventional social bonds, and moral beliefs (Hay 2001; Pratt and Cullen 2000; Reisig and Pratt 2011; Welch et al. 2006).

There is the question of whether religiosity predicts delinquency net of self control, or whether self control renders the effects of religiosity spurious. Per Gottfredson and Hirschi (see also Hirschi 2004), any effect of religion on substance use should be rendered spurious by self control, except for any effects religion might have on opportunities for deviance. Gottfredson and Hirschi would accept the possibility that certain religious beliefs might foster parenting practices that foster self control. Alternatively, according to Gottfredson and Hirschi's view, any effects of religion on delinquency would actually be spurious in the face of self control. The argument would be that religiosity involves selection processes wherein those with higher self control are attracted to and able to participate in religious observance (with its

behavioral prescriptions, etc.). However, people with low self control would not be attracted to religion and would have difficulty participating in most forms of religious observance (for a similar argument based on arousal theory, see Ellis 1987). In any case, the basic implication of Gottfredson and Hirschi's treatment is that self control should render the effects of religiosity on delinquency spurious.

If self control fully rendered spurious the effects of religiosity on delinquency, this would be consistent with the notion that religious observance simply ''sorts'' young people on the basis of their levels of self control, selecting only those with relatively higher self control. If that were true, then any observed religiosity–delinquency association would actually be due to between-individual differences in self control. Contrary to Gottfredson and Hirschi's predictions, however, we do not expect the relationship between religiosity and substance use to be rendered completely spurious by self control. Instead, we expect that religion will affect self control and self control will partially mediate the effect of religion on substance use. If so this would suggest that religious factors affect delinquency independently of self control. It might further imply that the effect of religiosity is not simply due to selection processes involving self control.

Suggestive evidence is provided by Tittle and Botchkovar (2005), who find that self control does not render spurious the effect of religion on criminal behavior in a sample of Russian adults. Also, Antonaccio and Tittle (2008) find that individual morality substantially reduces the probability of future crime among a representative sample of Ukrainian adults, and this effect is not eliminated by self control. Finally, Welch et al. (2006) found that religiosity had a direct negative effect on self-reported projected acts of deviance, and (contrary to the arguments of Gottfredson and Hirschi 1990) this effect was not rendered spurious by self control (which itself exhibited a moderate but significant negative relationship with projected deviance).

Drawing from the above, then, we test our second main hypothesis:

> H_2: Religiosity will be negatively associated with substance use even after controlling for self control. In other words, self control will not render spurious the effect of adolescents' religiosity on substance use.

Does Religion Condition the Effect of Self Control on Substance Use?

We identify two possibilities by which the strength of self control's effects on delinquency might depend on religiosity: (1) self control might have a stronger effect among the less religious or (2) self control might have a stronger effect among those with medium levels of religiosity. Schoepfer and Piquero (2006) found that when individuals held strong moral beliefs, low self control did not predict either instrumental or expressive crimes. When people held weak moral beliefs, low self control predicted both types of crime. This implies that strongly held moral beliefs (which religion, among other normative institutions, can provide) can override the effects of low self control. This possibility is suggested by Tittle et al. (2004:147–148), who distinguish between self control *desire* and self control *capability*: ''Those who can control themselves may not always want to do so; instead, they may sometimes deliberately choose to commit criminal acts, while those who lack the capacity for strong self control may nevertheless so fervently want to control themselves that they refrain from criminal acts.'' Perhaps, then, religiosity offsets the effects of low self control by increasing self control desire.

Another possibility is suggested by Wikstrom and Treiber's situational action theory (2007), which argues that morality is central to self control. Wikstrom and Treiber (2007) claim that the exercise of self control is limited to situations in which: (1) people exercise choice/agency between alternative actions and (2) define one or more of the actions as morally wrong. Thus, moral beliefs occasion the use of self control, in that self control is only necessary when an act is defined by a deliberating person as wrong. Religion, of course, is a major (but not the only) source of moral beliefs.

According to Antonaccio and Tittle's (2008:485) interpretation of Wikstrom and Treiber's (2007) theory, self control "...should be relevant only for individuals with medium amounts of morality and should have no bearing for those with high morality (who cannot imagine crime as an option) and low morality (who do not view criminal acts as morally wrong)." By extension, perhaps self control's effects on delinquency are strongest among those who exhibit a moderate degree of religiosity, but self control is less relevant among the very religious (for whom delinquency is subjectively unacceptable) and the comparatively irreligious (who may not believe that certain delinquent acts are wrong, thus rendering self control efforts irrelevant). Alas, like Welch et al. (2006), Antonaccio and Tittle (2008) found that self control and morality operated independently of each other, and failed to support the notion that self control mattered primarily for those of medium morality.

Thus, in addition to our main hypotheses, we explore two possible interactions between religiosity and self control:

H_3: Self control will have a stronger association with substance use among the less religious.

H_4: Self control will have a stronger association with substance use among those of medium religiosity than among those with low or high religiosity.

Contributions

Our study empirically goes beyond Welch et al. (2006) in several ways. First, we examine self reported marijuana and alcohol use, rather than *projected* behavioral intentions of minor deviance. Second, we utilize data from the National Longitudinal Study of Adolescent Health, a nationally representative sample of U.S. adolescent school students, rather than a local cross sectional sample of adults. In particular, we arguably have stronger measures of religiosity and religious affiliation, and also measures of parents' religiosity, self identification as a born again Christian, and religious literalism, than those employed by Welch et al. (2006). Welch et al. (2006) also did not include measures of religious affiliation, so this is a third way in which our study expands upon theirs. Our study also differs from and extends Antonaccio and Tittle's (2008) important contribution in the following ways: (1) we focus on religion specifically rather than broader morality, (2) we focus on a sample of American youth rather than Ukrainian adults, (3) we examine the effects of religion on self control in addition to the direct and interactive effects of religiosity and self control on delinquency, and (4) we examine self reported substance use rather than projected probabilities of engaging in acts. Finally, we answer McCullough and Willoughby's (2009) call for further research that addresses: (1) how religion affects deviant behavior by affecting self control and (2) how different aspects of religion (i.e., salience and behavior, denomination, identification) might affect self control.

DATA AND METHODS

We used data from the National Longitudinal Study of Adolescent Health (Add Health). The primary sampling frame for Add Health was a list of schools that included an 11th grade and an enrollment of more than thirty students. Schools were stratified by region of the country, urbanization, percent white, size, and school type (public, private, and parochial) and a sample of 80 high schools was selected with unequal probability. Fifty-two middle schools that supplied students to the high schools were also included in the sample (for a total of 132 schools). Based on school enrollment lists, students were randomly selected from each school to complete an In-Home Questionnaire. After students were stratified by sex and grade (7th–12th), approximately 200 students were randomly selected from each school. The Wave I In-Home Questionnaire was administered between April and December of 1995 ($n = 20{,}745$). At the same time, researchers also attempted to interview one of the adolescent's parents ($n = 17{,}713$). Researchers interviewed the same adolescents again (Wave II In-Home Questionnaire) between April and August of 1996 ($n = 14{,}738$).[4] In order to establish the appropriate temporal order between independent and dependent variables, all of the independent variables are taken from the first In-Home survey completed by the adolescents and the parent survey, while the dependent variables are taken from the second In-Home survey, which was collected a year later (for a complete description of the Add Health Data, see Bearman et al. 1997). For all of the analyses, we corrected for the unequal probability of selection and the clustering of students within schools (for a discussion of the Add Health sample ''design effects,'' and how corrections are made, see Chantala and Tabor 1999).

Dependent Variables: Marijuana Use and Drinking

For our dependent variables, we used two measures—marijuana use and drinking to intoxication. We focus on marijuana use and getting drunk for several reasons. First, previous research suggests that recreational substance use crimes are most likely to be affected by religiosity (Burkett and White 1974; Cochran and Akers 1989). This is because secular and religious values both condemn serious crime/delinquency like violence and stealing, but religious groups, especially evangelical Protestants, are more likely than secular ones to disapprove of things like excessive drinking and illicit drug use (Bock et al. 1987; Grasmick et al. 1991).[5] Second, compared to more serious types of delinquency, substance use is more prevalent among a wide

[4]Not all of the adolescents included in the first wave of Add Health were included in subsequent waves. For example, the vast majority of adolescents who were seniors in high school at Wave 1 were not re-interviewed at Wave 2. In addition to purposefully dropping certain members of the original sample, some adolescents who were eligible for Wave 2 were not interviewed again because they could not be located or they were unable or unwilling to be interviewed again. In total, 13,568 adolescents were included in both Wave 1 and Wave 2. Analysis of non-response suggests that sample attrition introduces very little bias in estimates of marijuana use and alcohol use, which we use for our dependent variables (Kalsbeek et al. 2001). Furthermore, the sample weights included in Add Health adjust for nonresponse at Wave II.

[5]Consistent with the anti-ascetic hypothesis, supplemental analysis suggested that adolescent religiosity (measured as church attendance, importance of religion, and frequency of prayer) did not have a significant effect on violence or property offenses. Therefore, although we find evidence that self control mediates the effect of adolescent religiosity, it is important to note these findings appear to be limited to substance use and may not generalize to other forms of delinquency.

variety of youth. Third, substance use should meaningfully involve self control, and self control is supposed to affect less severe deviance and ''analogous behaviors'' no less than serious crime.

Marijuana use was measured using an item that asked adolescents how many times in the last year they had used marijuana. The responses to this question ranged from 0 = ''never'' to 6 = ''everyday or almost everyday.'' Second, adolescents were asked ''Over the past 12 months, on how many days have you gotten drunk or 'very, very high' on alcohol?'' The response format for this item also ranged from ''never'' to ''everyday or almost everyday.''

Religiosity

Separate measures of adolescent's religiosity (alpha = .875) and parent's religiosity (alpha =.832) were constructed by combining survey questions about church attendance, importance of religion, and frequency of prayer. Respondents were asked to indicate their frequency of church attendance on a four-point scale ranging from ''never'' to ''once a week or more.'' They were also asked to indicate how important religion was to them, also on a four-point scale ranging from ''not important'' to ''very important.'' Frequency of prayer was coded on a scale ranging from ''never'' to ''at least once a day.'' The three items were asked in the same manner for both adolescents and parents. We summed scores on the three items to create composite measures of adolescent's religiosity and parent's religiosity which range from 0 to 9 with higher scores indicating greater religiosity.

We also expect that religious affiliation will influence self control and substance use. Religious groups differ widely in what they require of their members, with some imposing rather extraordinary restrictions and requirements and others requiring little or no sacrifice (Iannaccone 1994; Stark and Finke 2000). Given that religious groups are known for exerting more or less control over their members, we suspect religious traditions may vary in their impact on levels of personal self control. Specifically, we expect that members of stricter religious traditions, such as evangelical groups, may show higher levels of self control. ''Black Protestant'' groups include those denominations, such as the African Methodist Episcopal Zion, that have a historically African-American membership. Such traditionally black denominations, like white evangelicals, tend to be strict in their rules and requirements regarding social behavior. Given that evangelical groups also have strong prohibitions against substance use, we also expect evangelical youth to have lower rates of substance use (Bock et al. 1987; Cochran 1993; Grasmick et al. 1991).

We included variables for status as a born again Christian, religious literalism (fundamentalism), and a series of dummy variables for religious affiliation. First, adolescents were asked ''Do you think of yourself as a born again Christian?'' (1 = yes). Second, adolescents were asked ''Do you agree or disagree that the sacred scriptures of your religion are the word of God and are completely without any mistakes?'' (1 = yes). Third, adolescents were asked to report their religious affiliation, which could be a particular denomination (e.g., Lutheran, Methodist, Presbyterian), or a non-Christian religion (e.g., Buddhist, Hindu, Islam). Using the classification scheme (RELTRAD) proposed by Steensland et al (2000), we coded the adolescents' responses into one of six categories: Catholic, Black Protestant, evangelical Protestant, mainline Protestant, other, and none (no religious affiliation). Since there are few Jewish adolescents in the Add Health sample, we put Jewish youth in the ''other affiliation'' category. Given our expectation

that evangelicals will display higher levels of self control, and lower levels of substance use, we used evangelicals as the contrast category. Therefore, all coefficients represent the difference between a particular religious grouping and evangelicals.

Self Control

Self control consists of six dimensions or elements (Arneklev et al. 1993): impulsivity, a desire for simple tasks, risk-seeking, preference for physical activities, self-centeredness, and temper. Therefore, we used six items from the Wave I In-Home Questionnaire to construct a measure of self control (alpha = .629), which we use to predict adolescents' substance use.[6] For the first part of the analysis, we examine the effect of religion on self control. Therefore, we constructed an identical measure of self control using the same items from the Wave II In-Home Questionnaire (alpha = .616).

To construct our measure of self control, we used the same five items used by Perrone et al. (2004), who also used the Add Health data to study self control.[7] Adolescents were asked how often they had difficulty getting along with their teachers, paying attention in school, and getting homework done. Perrone et al. (2004) argue these items capture the temper, impulsivity, and preference for physical tasks dimensions of self control, respectively. Adolescents were also asked how often they had trouble keeping their minds on what they were doing. This item taps the preference for simple tasks dimension of self control. The last item, which Perrone et al. (2004) suggest indicates how self-centered an adolescent is, asked adolescents to indicate their level of agreement with the statement ''You feel you are doing everything just about right.'' In addition to the five items used by Perrone et al. (2004), we added a sixth item to measure risk-taking: ''When making decisions, you usually go with your gut feeling without thinking too much about the consequences of each alternative.'' Higher scores on the index indicate higher levels of self control.

Control Variables

Previous research suggests that sex, age, race, and social class are significantly related to adolescent substance use. First, males are more likely to engage in substance use than females (Watt and Rogers 2007). Second, older adolescents are more likely to use substances than younger adolescents (Hoffmann and Johnson 1998). Third, most studies indicate white youth are more likely than minorities to drink and use marijuana (Blum et al. 2000; Watt and Rogers 2007). Finally, although economic indicators are not consistently related to adolescent substance

[6]While our measure of self control does not reflect Hirschi's (2004) latest conceptualization, it is consistent with previous recent measurements in criminology, and is quite congruent with how self control has been conceptualized and measured in the psychological literature (e.g., Muraven et al. 1998). However, we incorporate other elements of Hirschi's new treatment of self control—specifically sources of inhibitions stemming from conventional social bonds—as control variables (e.g., parental and school attachment, grades). While Hirschi now emphasizes the conceptual unity of self and social control, for our purposes we preserve the distinction between self control and social bonds that can foster inhibitions.

[7]Many recent studies based on Add Health data have used the Perrone et al. (2004) index to measure self control (e.g., Beaver et al. 2009; Wright et al. 2009) or a modified version (e.g., Teasdale and Silver 2009).

use, there is some evidence that suggests adolescents from lower socioeconomic status homes are more likely to drink alcohol and use marijuana (Blum et al. 2000; Hoffmann and Johnson 1998).

Since previous research suggests that sex, age, race, and social class are significantly related to adolescent substance use, we controlled for the effects of these variables in our analysis. Sex was coded as a dichotomous variable (1 = male). Age is a continuous variable that is computed by subtracting the interview date from the adolescent's date of birth. Race was coded as a set of dummy variables. White youth were used as the contrast category. Hispanic ethnicity was also included as a dummy variable (1 = Hispanic). Social class was measured using two items: welfare and parent's education. First, parents were asked if they, or any other member of their household, received Supplemental Security Income (SSI), Aid to Families with Dependent Children (AFDC), food stamps, and/or a housing subsidy. Welfare was coded ''1'' if the respondent received any form of welfare and ''0'' if he/she did not receive public assistance. Second, adolescents were asked to report how far their mothers and fathers went in school (e.g., ''high school graduate,'' ''went to college but did not graduate''). Because many of the adolescents live in single parent households (education is listed as missing if the parent is absent), parent's education is based on the parent with the highest level of education.

Previous research also suggests that family structure and process are significantly related to adolescent substance use. Adolescents who reside in single-parent homes are more likely to use substances (Hoffmann and Johnson 1998; Watt and Rogers 2007). Adolescents who report higher levels of attachment to their parents, and whose parents report higher levels of attachment to them, are less likely to engage in substance use (Dornbusch et al. 2001; Kostelecky 2005; Watt and Rogers 2007). Therefore, in the analysis we included measures of family structure, parent's attachment to child, and child's attachment to parents. The first variable, ''intact family,'' is a dummy variable coded as ''1'' if the adolescent lived with both biological parents. Second, a measure of parent's ''attachment to child'' (alpha = .731) was created using six items (e.g., ''You get along well with him/her,'' ''You feel you can really trust him/her''). Finally, a measure of ''attachment to parents'' (alpha = .941) was created using five items (e.g., ''How close do you feel to your mom/dad,'' ''How much do you think he/she cares about you'').

In addition to family processes, school experiences are also significantly related to adolescent substance use, with higher attachment to school and higher academic achievement related to lower levels of adolescent substance use (Dornbusch et al. 2001; Kostelecky 2005). Therefore, we controlled for the effects of grades and school attachment in our analyses. Grades were measured using a computed grade point average (4 = A, 3 = B, 2 = C, and 1 = D or lower) based on grades youth received in multiple subjects during their most recent grading period (alpha =.982). Five items (alpha =.761) were used for a school attachment index (e.g., ''You feel like you are part of your school,'' ''You are happy to be at your school'').

As mentioned, we used two dependent variables, marijuana use and alcohol use. Depending on the outcome variable, we used a different measure of delinquent peers, a variable that has been consistently shown to predict a wide range of delinquency (Akers 1998; Watt and Rogers 2007). When marijuana use is used as the dependent variable, the measure of delinquent peers is ''Of your three best friends, how many use marijuana at least once a month?'' When alcohol use is used as the dependent variable, the measure of delinquent peers is ''Of your three best friends, how many drink alcohol at least once a month?'' Descriptive statistics for the dependent and independent variables are depicted in Table 1.

TABLE 1
Descriptive Statistics for Independent and Dependent Variables

	Range	*Mean*	*SD*
Individual characteristics			
Sex	0–1	.45	.50
Age	11–21	16.16	1.72
White	0–1	.50	.50
African American	0–1	.21	.41
Asian	0–1	.06	.24
Other race	0–1	.05	.22
Hispanic	0–1	.17	.38
Welfare	0–1	.19	.39
Parent education	0–18	13.73	2.69
Intact family	0–1	.51	.50
Attachment to child	0–16	12.76	2.55
Attachment to parents	0–20	16.67	3.11
Grades	0–4	2.68	.87
Attachment to school	0–20	13.42	3.76
Peers: Smoke marijuana	0–3	.63	1.00
Peers: Drink alcohol	0–3	1.11	1.17
Self control (Wave 1)	0–24	15.62	3.52
Religiosity			
Parent's religiosity	0–9	6.79	2.56
Adolescent's religiosity	0–9	5.84	3.15
Born again	0–1	.26	.44
Religious literalism	0–1	.66	.47
Evangelical Protestant	0–1	.15	.36
Black Protestant	0–1	.17	.37
Mainline Protestant	0–1	.19	.39
Catholic	0–1	.27	.44
Other affiliation	0–1	.10	.30
No religion	0–1	.12	.33
Dependent variables			
Self control (Wave 2)	0–24	16.00	3.38
Marijuana use (Wave 2)	0–6	.61	1.23
Alcohol use (Wave 2)	0–6	.68	1.31

RESULTS

Table 2 depicts the results for the analysis of self control. In order to establish the appropriate temporal order between variables, all of the independent variables, including our measures of religion, are taken from the first In-Home survey and the parent survey, while self control is measured using items from the second In-Home survey. For the first model, we included demographic variables and, since Gottfredson and Hirschi (1990) argue that self control can be influenced by parenting, several family variables. Many of the variables included in the baseline model (Model 1) have significant effects on self control. Boys, for example, exhibit lower levels of self control than girls. Contrary to Gottfredson and Hirschi, who argue that self control is established early in life and remains fairly constant thereafter, the results suggest that self control

TABLE 2
Unstandardized OLS Regression Coefficients for the Effects of Religion (Wave 1) on Self Control (Wave 2) (Adjusted Standard Errors in Parentheses)

	Model 1	*Model 2*	*Model 3*
Individual characteristics			
Sex	−.610 (.088)**	−.579 (.090)**	−.567 (.091)**
Age	.131 (.034)**	.139 (.034)**	.156 (.034)**
African American	.193 (.146)	.100 (.144)	−.404 (.268)
Asian	.225 (.261)	.165 (.269)	.099 (.270)
Other race	−.348 (.216)	−.323 (.217)	−.169 (.225)
Hispanic	−.234 (.204)	−.273 (.208)	−.343 (.214)
Welfare	−.002 (.122)	.027 (.124)	.057 (.118)
Parent education	.038 (.019)*	.034 (.018)	.036 (.020)
Intact family	.334 (.094)**	.300 (.096)**	.271 (.101)**
Attachment to child	.177 (.022)**	.175 (.023)**	.162 (.022)**
Attachment to parents	.249 (.018)**	.244 (.018)**	.248 (.018)**
Religiosity			
Parent's religiosity		−.001 (.020)	−.012 (.022)
Adolescent's religiosity		.058 (.019)**	.090 (.027)**
Born again			.079 (.121)
Religious literalism			.302 (.152)*
Black Protestant			.588 (.304)
Mainline Protestant			.045 (.152)
Catholic			.206 (.149)
Other affiliation			.008 (.163)
No religion			.723 (.279)*
Constant	7.10	6.80	6.13
F	29.94**	26.89**	18.60**
df	128	128	127
R^2	.086	.090	.094
N	9816	9733	9182

*$p < .05$; **$p < .01$.

increases over the course of adolescence, a finding more consistent with the recent psychological models of self control discussed earlier. As parent's education increases, adolescents demonstrate higher levels of self control. Finally, all of the family variables included in the model are significantly related to self control. Adolescents who live with their biological parents have more self control, compared to adolescents who do not live with their biological parents. Adolescents also have more self control when their parents are attached to them, and when they are attached to their parents.

For the second model, we added parent's religiosity and adolescent's religiosity. Consistent with our hypothesis, adolescent's religiosity has a positive effect on self control. Thus, religious youth have higher levels of self control than non-religious youth. In contrast, parent's religiosity does not have a significant effect on self control. When adolescent's religiosity was not included in the model (results not shown), parent's religiosity had a significant, positive effect on self control (coeff = .038, $p < .05$). Including adolescent's religiosity, however, eliminates the effect of parent's religiosity on self control. Therefore, the effect of parent's religiosity on self control is

indirect. Religious parents are more likely to have religious adolescents who, in turn, are more likely to have high self control.

For the final model of self control, we added born again Christian, religious literalism, and religious affiliation. Controlling for additional measures of religion, adolescent religiosity still has a significant effect on self control. Also, adolescents who believe in a literal interpretation of sacred scriptures, a measure of fundamentalism, have significantly higher levels of self control. In contrast, self identification as a born again Christian does not have a significant effect on self control. Unexpectedly, compared to evangelical Protestants, adolescents who do not identify with any religion exhibit *greater* self control.

In addition to the significant relationship between adolescent religiosity, measured at Wave 1, and self control, measured at Wave 2, supplemental analysis (results not shown) indicated that a change in adolescent religiosity from Wave 1 to Wave 2 (Wave 1 religiosity – Wave 2 religiosity) also had a significant effect on adolescents' self control. This further suggests that variation in religiosity predicts later levels of adolescents' self control.

Table 3 depicts the results for the analysis of religiosity, self control, and marijuana use. For model 1, we included all of the measures of religiosity: parent's religiosity, adolescent's religiosity, born again Christian, religious literalism, and religious affiliation. Only adolescent's religiosity is significantly related to marijuana use. Religious adolescents are significantly less likely to use marijuana.

For Model 2, we added self control to the model, in order to determine if the effect of adolescent's religiosity on marijuana use is mediated by self control. Self control has a significant direct effect on marijuana use. Adolescents with high self control are less likely to use marijuana. Including self control in the model reduces the effect of adolescent's religiosity on marijuana use by 5.2%, which is a significant indirect effect.[8] In order to gauge the strength of this relationship, we conducted a similar analysis (results not shown) using other variables that could potentially mediate the effect of adolescent's religiosity on marijuana use. The results of the supplemental analysis indicated that adolescent religiosity had significant indirect effects on marijuana use through association with delinquent peers and attachment to parents. Association with delinquent peers reduced the effect of adolescent's religiosity on marijuana use by 33.8%, while attachment to parents reduced religiosity's effect by 6.4%. Parents' attachment to their children, grades, and school attachment did not mediate a significant portion of the effect of religiosity on marijuana use. Thus, although much of the effect of adolescent's religiosity on marijuana use is mediated by delinquent peers, self control mediates more of the effect than parents' attachment to child, grades, or school attachment. Furthermore, none of these variables, including self control and delinquent peers, fully mediated/rendered spurious the effects of religiosity.

[8]The indirect effect of adolescent religiosity on marijuana use can be determined by subtracting the effect of adolescent religiosity on marijuana use when the mediator (self control) is included in the model (model 2, coefficient = −.036) from the effect of adolescent religiosity when the mediator is not included in the model (model 1, coefficient = −.038). Therefore, the indirect effect of adolescent religiosity on marijuana use is − .038– −.036 = −.002. Dividing the indirect effect by its standard error determines whether or not the indirect effect is significant (formulas for computing the standard error of an indirect effect can be found in MacKinnon 2008). Dividing the indirect effect (−.002) by the total effect (−.038) yields the percentage of the total effect that is mediated or indirect (5.2%). This percentage provides an indication of the effect size (i.e., the larger the percentage, the larger the indirect effect).

TABLE 3
Unstandardized OLS Regression Coefficients for the Effects of Religion (Wave 1) and Self Control (Wave 1) on Marijuana Use (Wave 2) (Adjusted Standard Errors in Parentheses)

	Model 1	*Model 2*	*Model 3*
Individual characteristics			
Sex	.034 (.035)	.017 (.034)	.017 (.034)
Age	.004 (.009)	.009 (.009)	.009 (.009)
African American	−.171 (.074)*	−.167 (.076)*	−.166 (.077)*
Asian	−.194 (.054)**	−.199 (.055)**	−.199 (.056)**
Other race	.029 (.068)	.033 (.068)	.034 (.068)
Hispanic	.093 (.051)	.099 (.050)*	.099 (.050)*
Welfare	−.064 (.046)	−.067 (.047)	−.066 (.048)
Parent education	.029 (.005)**	.027 (.005)**	.027 (.005)**
Intact family	−.118 (.032)**	−.114 (.032)**	−.113 (.032)**
Attachment to child	−.033 (.008)**	−.030 (.008)**	−.030 (.008)**
Attachment to parents	−.025 (.007)**	−.018 (.006)**	−.018 (.006)**
Grades	−.046 (.017)**	−.006 (.018)	−.005 (.018)
School attachment	−.014 (.004)**	−.005 (.005)	−.005 (.005)
Delinquent peers	.616 (.028)**	.600 (.028)**	.600 (.028)**
Religiosity			
Parent's religiosity	.005 (.008)	.004 (.008)	.004 (.008)
Adolescent's religiosity	−.038 (.008)**	−.036 (.008)**	−.053 (.025)*
Born again	−.003 (.036)	−.010 (.036)	−.010 (.036)
Religious literalism	−.018 (.037)	−.007 (.037)	−.007 (.036)
Black Protestant	−.028 (.094)	.001 (.096)	−.000 (.097)
Mainline Protestant	−.011 (.040)	−.008 (.039)	−.009 (.039)
Catholic	.013 (.045)	.015 (.045)	.015 (.045)
Other affiliation	−.011 (.051)	−.006 (.052)	−.006 (.053)
No religion	−.137 (.086)	−.114 (.086)	−.115 (.086)
Self control		−.034 (.005)**	−.041 (.010)**
Adolescent's religiosity × self control			.001 (.001)
Constant	1.30	1.40	1.50
F	45.59**	43.31**	41.49**
df	127	127	127
R^2	.302	.308	.308
N	9460	9441	9441

*$p < .05$; **$p < .01$.

Based on previous research, we developed alternate hypotheses regarding the interactive effects of religiosity and self control on delinquency. Therefore, for Model 3, we tested the interaction between religiosity and self control on marijuana use. The interaction term is not significant.[9]

[9]Interaction terms often cause problems with multicollinearity. The most common approach to alleviating multicollinearity is to ''center'' (or ''standardize'') the independent variables before creating the interaction term (Aiken and West 1991). We conducted the analysis using both standardized and unstandardized interaction terms. The results for the unstandardized interaction terms are reported in Table 3 and Table 4. The results for the standardized interaction terms were substantively the same.

TABLE 4
Unstandardized OLS Regression Coefficients for the Effects of Religion (Wave 1) and Self Control (Wave 1) on Alcohol Use (Wave 2) (Adjusted Standard Errors in Parentheses)

	Model 1	*Model 2*	*Model 3*
Individual characteristics			
Sex	.101 (.038)*	.080 (.038)*	.081 (.038)*
Age	.067 (.011)**	.074 (.011)**	.075 (.011)**
African American	−.221 (.105)*	−.218 (.108)*	−.215 (.110)
Asian	−.319 (.104)**	−.325 (.111)**	−.327 (.110)**
Other race	−.059 (.081)	−.058 (.079)	−.056 (.080)
Hispanic	−.057 (.059)	−.054 (.057)	−.054 (.057)
Welfare	−.103 (.048)*	−.105 (.047)*	−.103 (.047)*
Parent education	.009 (.008)	.007 (.008)	.007 (.008)
Intact family	−.016 (.038)	−.012 (.038)	−.011 (.038)
Attachment to child	−.022 (.009)*	−.019 (.008)*	−.019 (.008)*
Attachment to parents	−.022 (.007)**	−.014 (.007)	−.014 (.007)
Grades	−.057 (.023)*	−.011 (.026)	−.010 (.026)
School attachment	−.007 (.006)	.003 (.006)	.003 (.006)
Delinquent peers	.422 (.020)**	.405 (.019)**	.405 (.019)**
Religiosity			
Parent's religiosity	−.007 (.008)	−.009 (.008)	−.009 (.008)
Adolescent's religiosity	−.029 (.010)**	−.028 (.011)*	−.075 (.033)*
Born again	.014 (.042)	.007 (.042)	.006 (.042)
Religious literalism	.074 (.047)	.087 (.048)	.088 (.048)
Black Protestant	−.006 (.118)	.023 (.121)	.019 (.123)
Mainline Protestant	.160 (.053)**	.162 (.053)**	.160 (.053)**
Catholic	.275 (.063)**	.276 (.064)**	.274 (.064)**
Other affiliation	.088 (.061)	.090 (.062)	.090 (.062)
No religion	−.015 (.103)	.004 (.103)	.001 (.104)
Self control		−.039 (.006)**	−.057 (.013)**
Adolescent's religiosity × self control			.003 (.002)
Constant	.14	.23	.49
F	43.02**	41.50**	40.02**
df	127	127	127
R^2	.213	.219	.220
N	9586	9568	9568

*$p < .05$; **$p < .01$.

In order to test the hypothesis that self control is most relevant to adolescents with medium levels of religiosity, we split the sample into low, medium, and high religiosity.[10] To test the divergent effects of self control for adolescents with different levels of religiosity, we used the equation $t = b_1 - b_2/\sqrt{(SEb_1^2 + SEb_2^2)}$ (Paternoster et al. 1998). Although self control had

[10]Our measure of adolescent religiosity ranges from 0–9. Since the mean level of religiosity is almost six (5.84), we classified adolescents with a score of 5, 6, or 7 as medium religiosity. Adolescents with a score of 0 to 4 were classified as low religiosity and those with a score of 8 or 9 were classified as high religiosity. Approximately 25% of the sample is low in religiosity, 30% is medium religiosity, and 45% is high religiosity.

a significant effect on marijuana use for each of the three subsamples, the coefficients for self control were not significantly different between groups. That is, self control did not have a stronger effect on marijuana use for any of the subgroups. Instead, self control had an equal effect on marijuana use, regardless of adolescents' level of religiosity.

Table 4 depicts the results for the analysis of religiosity, self control, and alcohol use. Similar to the results for marijuana use, parent's religiosity, self identification as a born again Christian, and biblical literalism are unrelated to alcohol use. Also, as was the case for marijuana use, religious adolescents are significantly less likely to use alcohol. In contrast to the results for marijuana use, where there are no significant differences for religious affiliation, there are differences in alcohol use. Specifically, compared to evangelical Protestants, mainline Protestants and Catholics are significantly more likely to use alcohol.

In Model 2 we added self control. Consistent with the results for marijuana use, self control has a significant direct effect on alcohol use. Adolescents with high self control are less likely to use alcohol. Including self control in the model reduces the effect of religiosity on alcohol use by 5.6%, which is a statistically significant indirect effect. By way of comparison, association with delinquent peers reduces the effect of adolescent's religiosity on marijuana use by 33.4% and attachment to parents by 5.7%, which are also statistically significant indirect effects. Adolescent religiosity did not have significant indirect effects on alcohol use through attachment to child, grades, or school attachment.[11] Thus, as was the case for marijuana use, the effect of religiosity on alcohol use is mediated primarily by associating with delinquent peers. Self control, however, mediates as much of the effect of religiosity on alcohol use as attachment to child and/or parents, grades, and school attachment.

Supplemental analysis (results not shown) indicated that change in adolescent religiosity from Wave 1 to Wave 2 (Wave 1 religiosity – Wave 2 religiosity) and change in self control from Wave 1 to Wave 2 (Wave 1 self control – Wave 2 self control) also had significant effects on adolescents' marijuana use and alcohol use. Therefore, even when considering change in religiosity and change in self control across waves, levels of self control still do not render the effects of religiosity spurious.

For Model 3, we tested the interaction between religiosity and self control. As was the case for marijuana use, the interaction between religiosity and self control does not have a significant effect on alcohol use. The results for the interaction between religiosity and self control comparing adolescents with low, medium, and high religiosity, however, suggested significant differences between groups. Specifically, for the low religiosity group, the coefficient for self control (−.063) was twice as large as the coefficient for adolescents with medium religiosity (−.031) and high religiosity (−.030). Furthermore, the effect of self control on alcohol use for adolescents with low religiosity was significantly greater than the effect of self control for adolescents with high religiosity ($t = -2.27$) and almost significantly greater than the effect for medium religiosity ($t = -1.86$). Therefore, contrary to the hypothesis we derived from

[11]We focus on self control as an intervening variable between religiosity and delinquency. We also tested the alternative model, that religiosity serves as an intervening variable between self control and delinquency. The results of the supplemental analysis indicated that 1.7% of the effect of self control on marijuana use was mediated by adolescent religiosity, while religiosity mediated 1.0% of the effect of self control on alcohol use.

Antonaccio and Tittle (2008), the results suggest that self control has a stronger effect on alcohol use for adolescents with low, rather than medium, religiosity.[12]

CONCLUSION

Consistent with our central hypotheses, we find adolescents' religiosity is significantly and positively related to later self control, religiosity and self control both in turn reduce marijuana and alcohol use, and self control partially but not fully mediates the effects of religiosity on these forms of delinquency. The results are substantively the same when we consider change in self control and change in religiosity from Wave 1 to Wave 2. We also found that association with delinquent peers mediated/explained even more of religiosity's effects on marijuana and getting drunk. Contrary to our expectations, parents' religiosity did not have a direct effect on adolescents' self control or substance use. Instead, the effect of parents' religiosity on adolescents self control and substance use appears to be indirect through adolescents' religiosity. Our analysis of religiosity's effects on self control also revealed an unexpected finding—religious ''nones'' have significantly higher levels of self control than evangelical Protestants.

The finding for religious ''nones'' may appear surprising at first glance. After all, if religiosity is positively related to self control, why would those who seemingly have no religion have higher levels of self control? In fact, research has found that only a small subset of those who select ''no religion'' in a survey can be accurately classified as irreligious or atheist in orientation. Based on data from the General Social Survey, Sherkat (2008) found that only 13.8% of religious nones are atheists (another 18.7% are agnostics). Rather than being irreligious, based on the Baylor Religion Survey, Stark (2008) reports that the majority of religious nones profess some belief in God and the majority of nones pray (32% of religious nones reported praying several times a week or more). According to Stark (2008:144), ''what 'no religion' seems to mean to most who give this response is that they reject conventional religions, but not supernaturalism of more exotic sorts—two-thirds of them can be classified as New Agers.'' Furthermore, research using longitudinal data suggests that almost a third of those who choose no religion claim a religious affiliation one year later (Lim et al. 2010). In sum, research suggests that the ''nones'' are not irreligious, but rather primarily consist of those who are not *currently* attached to major denominations or traditions.

As expected, we find that adolescents' religiosity (and change therein) has a significant effect on marijuana use and drinking. Religious youth are less likely to use marijuana and alcohol than non-religious youth. Similarly, those with greater self control are less likely to use alcohol to excess or smoke marijuana. Furthermore, we also find that self control mediates part of the effect

[12]There is a great deal of disagreement about how to measure self control (see Hirschi 2004 and Piquero and Buffard 2007 for reviews). Our measure of self control is probably not ideal, and there may be some conceptual overlap between some of the items and other constructs. We examined some alternative combinations of Add Health items in measuring self control, but these did not perform substantially better or alter our substantive findings to a meaningful degree. For example, we replicated the analysis of marijuana use and drinking using the same five items used by Perrone et al. (2004) (see methods section for the exact items), as well as a modified four item measure of self control, a different six item measure, and an eleven item measure. Similar to the results reported in the text, adolescents with high self control were significantly less likely to use marijuana and alcohol. We did not find a significant interaction between adolescent religiosity and any of the alternative measures of self control. Thus, supplemental analysis suggests our results can be replicated with alternative measures of self control.

of adolescents' religiosity on delinquency. Including self control in the model reduces the effect of religiosity on marijuana use by 5.2% and alcohol use by 5.6%. Although our supplemental analysis suggests that much of the effect of religiosity on delinquency is also mediated by delinquent peers, self control is still an important intervening mechanism between religiosity and delinquent behavior. Self control appears to mediate more of the effect of religiosity on marijuana use and drinking than does parents' attachment to adolescents, adolescents' attachment to parents, school attachment, or grades. However, neither self control nor delinquent peers fully render spurious the effect of adolescent religiosity on substance use. That is, a portion of adolescent religiosity's effect on substance use was not attributable to either self control or association with delinquent peers, a finding that coincides with research by Johnson et al. (2001).

How do our findings square with Gottfredson and Hirschi's model of self control? Several findings call some of their propositions into question. Consistent with their theory, self control did insulate youth from marijuana use and heavy drinking, two forms of delinquency that should meaningfully entail the operation of self control. However, self control did not fully mediate religiosity's effects, and association with delinquent peers also significantly promoted marijuana use and getting drunk even with self control in the model. These two findings do not support Gottfredson and Hirschi's strong claims that self control is the principal individual predictor of deviance.

In addition, we found a positive connection between earlier religiosity and later self control in adolescence. Unfortunately, the data do not allow us to fully disentangle the causal priority of religion and self control, in that we have no measures of self control before Wave 1 of the survey. However, recall that our supplemental analysis found that *change* in religiosity (net of parent religiosity) between Wave 1 and Wave 2 also predicted self control at Wave 2. This is more consistent with the notion that religiosity might positively affect self control.

Taken as a whole, our findings suggest that, since religiosity's effects on substance use are not entirely mediated by self control, religiosity's effects on substance use are not entirely due to selection processes involving self control. This, coupled with the finding that religiosity (and changes in religiosity) predicts self control, at least raises the possibility that religiosity increases self control (at least absolute levels of self control) just as weight training strengthens muscles (Geyer and Baumeister 2005). That is, religious participation and experience might strengthen self control in an absolute sense, regardless of between-individual differences in self control. The relationship also may be reciprocal. Religious observance may tend to ''weed out'' *some* people with very low self control. But religion may also increase the self control of others, including those lower in the relative self control distribution, by increasing their self control ''desire.'' Whether religion can compensate for or alter relative between-individual differences in self control is an important question for further research. However, it may be very difficult to truly test the strong Gottfredson and Hirschi claim that self control is causally prior to religiosity. One would have to somehow simultaneously measure the development of self control and religion longitudinally throughout childhood and adolescence.

We also posited two alternative possibilities for interaction effects between religiosity and self control. However, consistent with the results of Welch et al. (2006), and largely consistent with the results of Antonaccio and Tittle (2008), we did not find that interaction terms between religiosity and self control were significant. Thus, although adolescents' religiosity and self control both have significant direct effects on marijuana and alcohol use, the effect of one does not appear to condition the effect of the other in a straightforward, multiplicative way.

However, based on arguments by Wikstrom and Treiber (2007) and Antonaccio and Tittle (2008), we also tested the possibility that self control might only decrease delinquency among those with medium levels of religiosity. We found instead that self control had a moderately larger effect on alcohol use among those of low religiosity. This is somewhat congruent with the findings of Schoepfer and Piquero (2006), who found that self control had stronger effects on delinquency among those with weaker moral beliefs. It may be that religiosity is an additional source of restraint that can compensate for low self control in the face of temptations for heavy adolescent drinking. Among the less religious, on the other hand, individual differences in self control may be more decisive in differentiating between those youth who use alcohol heavily and those who do not. We caution against placing too much stock in this finding, however, since it only appeared for alcohol use and not for marijuana use. In general, exploring the degree to which religiosity moderates the effect of self control, and vice versa, remains an important direction for future research.

It is important to note that Wikstrom and Treiber (2007), Schoepfer and Piquero (2006), and Antonaccio and Tittle (2008) emphasize moral beliefs about the wrongfulness of behaviors. In contrast, we focus specifically on adolescents' religiosity, as opposed to a broader focus on moral beliefs. Adolescents may not be receptive to all of the moral teachings of their religion. Adolescents may strongly agree with some of the moral messages they receive from religion (e.g., love your neighbor, don't steal), but may express only mild agreement with some moral prohibitions (e.g., premarital sex) and they may completely disagree with others. Even some very religious adolescents may believe there is nothing inherently wrong with smoking marijuana or getting drunk on occasion. On the other hand, some non-religious adolescents may avoid smoking marijuana and drinking because of beliefs about the health consequences of these activities (e.g., ''I think marijuana and alcohol are bad for me''), or fear of legal consequences (e.g., ''marijuana and underage drinking are illegal and I might get caught''). Health and legal concerns might be beliefs/attitudes that mobilize self control in the ways Wikstrom and Treiber (2007) describe, and such beliefs/attitudes are not *intrinsically* tied to religion. Thus, although we do not find evidence of significant interactions between adolescents' religiosity and self control, there still may be important interaction effects between self control and moral beliefs.

In addition to the suggestions we noted above, this study points to several other directions for future research. First, future research should try to untangle the direct and indirect relationships between parent religiosity and adolescent self control. For example, to what extent does parental religiosity affect self control through adolescents' religiosity and/or through parent/child attachment? Research should also investigate the notion that a religious mismatch between parent and adolescent might interfere with the development or strengthening of self control (see Pearce and Haynie 2004). Second, research should further investigate direct effects of religiosity and participation in religious activities as a social learning process. In reality, the causal pathways between religion, the learning of moral values, beliefs and attitudes, and the strengthening and exercise of self control are probably quite complex and mutually reinforcing. Research should attempt to disentangle these potential causal chains and investigate religion as a complex social learning process that *includes* the development and exercise of self control (for elaboration, see Akers 1998; Geyer and Baumeister 2005; Wikstrom and Treiber 2007).

In a related vein, a third research direction would involve the role of socially learned neutralizations/vocabularies of motive in the face of religious beliefs prohibiting some kinds of conduct. It is well known that techniques of neutralization can be used to define away moral qualms

about certain behaviors (Sykes and Matza 1957). If so, such neutralizations would short circuit the self control process described by Wikstrom and Treiber (2007), in which the use of self control depends on the applicability of moral belief (see Antonaccio and Tittle 2008).

If religious individuals are more likely to develop self control, then youth participation in faith-based programs that emphasize sensitivity to others, the importance of delaying gratification, and the consideration of long-term consequences (all of which are elements of self control) could lead to a reduction in a wide variety of problem behaviors, such as delinquency, alcohol use, drug use, and risky sexual behaviors. In addition, faith-based activities might build the kinds of inhibitions based on conventional social bonds now emphasized by Hirschi (2004) as intertwined with self control. If self control is like a muscle that people exercise when they face temptations to do things they believe are wrong, faith-based programs might serve as coaches in developing that muscle.

REFERENCES

Aiken, Leona S. and Stephen G. West. 1991. *Multiple Regression: Testing and Interpreting Interactions*. Newbury Park, CA: Sage.

Akers, Ronald. 1998. *Social Learning and Social Structure: A General Theory of Crime and Deviance*. Boston, MA: Northeastern University Press.

Antonaccio, Olena and Charles R. Tittle. 2008. ''Morality, Self Control, and Crime.'' *Criminology* 46:479–510.

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.

Bearman, Peter S., Jo Jones, and Richard J. Udry. 1997. *The National Longitudinal Study of Adolescent Health: Research Design*. Carolina Population Center, University of North Carolina at Chapel Hill.

Beaver, Kevin M., Matt DeLisi, John Paul Wright, and Michael Vaughn. 2009. ''Gene-Environment Interplay and Delinquent Involvement: Evidence of Direct, Indirect, and Interactive Effects.'' *Journal of Adolescent Research* 24: 147–168.

Blum, Robert W., Trisha Beuhring, Marcia L. Shew, Linda H. Bearinger, Renée E. Sieving, and Michael D. Resnick. 2000. ''The Effects of Race/Ethnicity, Income, and Family Structure on Adolescent Risk Behaviors.'' *American Journal of Public Health* 90:1879–1884.

Bock, E. Wilbur, John K. Cochran, and Leonard Beeghley. 1987. ''Moral Messages: The Relative Influence of Denomination on the Religiosity-Alcohol Relationship.'' *Sociological Quarterly* 28:89–103.

Burkett, Steven R. and Mervin White. 1974. ''Hellfire and Delinquency: Another Look.'' *Journal for the Scientific Study of Religion* 13:455–462.

Chantala, Kim and Joyce Tabor. 1999. *Strategies to Perform a Design-Based Analysis using the Add Health Data*. Carolina Population Center, University of North Carolina at Chapel Hill.

Chitwood, Dale D., Michael L. Weiss, and Carl G. Leukefeld. 2008. ''A Systematic Review of Recent Literature on Religiosity and Substance Use.'' *Journal of Drug Issues* 38:653–688.

Cochran, John K. 1993. ''The Variable Effects and Denomination on Adolescent Self-Reported Alcohol Use by Beverage Type.'' *Journal of Drug Issues* 23:479–491.

Cochran, John K. and Ronald L. Akers. 1989. ''Beyond Hellfire: An Exploration of the Variable Effects of Religiosity on Adolescent Marijuana and Alcohol Use.'' *Journal of Research in Crime and Delinquency* 26:198–225.

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* 19:227–255.

Desmond, Scott A., George Kikuchi, and Kristen Budd. 2010. ''Does Change in Teenage Religiosity Predict Change in Marijuana Use Over Time?'' *Interdisciplinary Journal of Research on Religion* 6:1–30.

Desmond, Scott A., Sarah E. Soper, and Rachel Kraus. 2011. ''Religiosity, Peers, and Delinquency: Does Religiosity Reduce the Effect of Peers on Delinquency?'' *Sociological Spectrum* 31:665–694.

Dornbusch, Sanford M., Kristan Glasgow Erickson, Jennifer Laird, and Carol A. Wong. 2001. ''The Relation of Family and School Attachment to Adolescent Deviance in Diverse Groups and Communities.'' *Journal of Adolescent Research* 16:396–422.

Ellis, Lee. 1987. ''Religiosity and Criminality from the Perspective of Arousal Theory.'' *Journal of Research in Crime and Delinquency* 24:215–232.

Geyer, Anne and Roy F. Baumeister. 2005. ''Religion, Morality, and Self Control.'' Pp. 412–432 in *Handbook of the Psychology of Religion and Spirituality*, edited by Raymond F. Paloutzian and Crystal L. Park. New York: Guilford Press.

Gottfredson, Michael and Travis Hirschi. 1990. *A General Theory of Crime*. Stanford, CA: Stanford University Press.

Grasmick, Harold G., Karyl Kinsey, and John K. Cochran. 1991. ''Denomination, Religiosity, and Compliance with the Law: A Study of Adults.'' *Journal for the Scientific Study of Religion* 30:99–107.

Hay, Carter. 2001. ''Parenting, Self Control, and Delinquency: A Test of Self Control Theory.'' *Criminology* 39: 707–736.

Hay, Carter and Walter Forrest. 2006. ''The Development of Self Control: Examining Self Control Theory's Stability Thesis.'' *Criminology* 44:739–774.

Hill, Terence D., Amy M. Burdette, Michael L. Weiss, and Dale D. Chitwood. 2009. ''Religious Involvement and Adolescent Substance Use.'' Pp. 171–189 in *Adolescent Substance Abuse: Evidence Based Approaches to Prevention and Treatment*, edited by Carl G. Leukefeld, Thomas P. Gullotta, and Michelle Staton-Tindall. New York: Springer.

Hirschi, Travis. 2004. ''Self Control and Crime.'' Pp. 537–552 in *Handbook of Self Regulation: Research, Theory, and Applications*, edited by Roy F. Baumeister and Kathleen D. Vohs. New York: Guilford Press.

Hoffmann, John P. and Robert A. Johnson. 1998. ''A National Portrait of Family Structure and Adolescent Drug Use.'' *Journal of Marriage and the Family* 60:633–645.

Iannaccone, Laurence R. 1994. ''Why Strict Churches are Strong.'' *American Journal of Sociology* 99:1180–1211.

Jang, Sung Joon and Byron R. Johnson. 2001. ''Neighborhood Disorder, Individual Religiosity, and Adolescent Use of Illicit Drugs: A Test of Multilevel Hypotheses.'' *Criminology* 39:109–144.

Johnson, Byron R. and Sung Joon Jang. 2010. ''Crime and Religion: Assessing the Role of the Faith Factor.'' Pp. 117–149 in *Contemporary Issues in Criminological Theory and Research: The Role of Social Institutions*, edited by Richard Rosenfeld, Kenna Quinet, and Crystal Garcia. Belmont, CA: Wadsworth.

Johnson, Byron R., Sung Joon Jang, David B. Larson, and Spencer De Li. 2001. ''Does Adolescent Religious Commitment Matter?: A Reexamination of the Effects of Religiosity on Delinquency.'' *Journal of Research in Crime and Delinquency* 38:22–44.

Kalsbeek, William D., Carolyn B. Morris, and Benjamin J. Vaughn. 2001. *Effects of Nonresponse on the Mean Squared Error of Estimates from a Longitudinal Study*. Carolina Population Center, University of North Carolina at Chapel Hill.

Kostelecky, Kyle L. 2005. ''Parental Attachment, Academic Achievement, Life Events, and Their Relationship to Alcohol and Drug Use During Adolescence.'' *Journal of Adolescence* 28:665–669.

Laird, Robert D., Loren D. Marks, and Matthew D. Marrero. 2011. ''Religiosity, Self-Control, and Antisocial Behavior: Religiosity as a Promotive and Protective Factor.'' *Journal of Applied Developmental Psychology* 32:78–85.

Latimore, T. Lorraine, Charles Tittle, and Harold Grasmick. 2006. ''Childrearing, Self Control, and Crime: Additional Evidence.'' *Sociological Inquiry* 76:343–371.

Laub, John and Robert Sampson. 2003. *Shared Beginnings, Divergent Lives*. Cambridge, MA: Harvard University Press.

Lim, Chaeyoon, Carol Ann MacGregor, and Robert D. Putnam. 2010. ''Secular and Liminal: Discovering Heterogeneity among Religious Nones.'' *Journal for the Scientific Study of Religion* 49:596–618.

MacKinnon, David P. 2008. *Introduction to Statistical Mediation Analysis*. New York: Lawrence Erlbaum Associates.

McCullough, Michael E. and Brian L. B. Willoughby. 2009. ''Religion, Self Regulation, and Self Control: Associations, Explanations, and Implications.'' *Psychological Bulletin* 135:69–93.

Muraven, Mark, Greg Pogarsky, and Dikla Shmueli. 2006. ''Self Control Depletion and the General Theory of Crime.'' *Journal of Quantitative Criminology* 22:263–277.

Muraven, Mark, Dianne M. Tice, and Roy F. Baumeister. 1998. ''Self Control as a Limited Resource: Regulatory Depletion Patterns.'' *Journal of Personality and Social Psychology* 74:774–789.

Nye, F. Ivan. 1958. *Family Relationships and Delinquent Behavior*. New York: Wiley.

Paternoster, Raymond, Robert Brame, Paul Mazerolle, and Alex Piquero. 1998. ''Using the Correct Statistical Test for the Equality of Regression Coefficients.'' *Criminology* 36:859–866.

Pearce, Lisa D. and Dana L. Haynie. 2004. ''Intergenerational Religious Dynamics and Adolescent Delinquency.'' *Social Forces* 82:1553–1572.

Perrone, Dina, Christopher J. Sullivan, Travis C. Pratt, and Satenik Margaryan. 2004. ''Parental Efficacy, Self Control, and Delinquency: A Test of a General Theory of Crime on a Nationally Representative Sample of Youth.'' *International Journal of Offender Therapy and Comparative Criminology* 48:298–312.

Piquero, Alex and Jeff Buffard. 2007. ''Something Old, Something New: A Preliminary Investigation of Hirschi's Redefined Self Control.'' *Justice Quarterly* 24:1–27.

Pratt, Travis and Francis Cullen. 2000. ''The Empirical Status of Gottfredson and Hirschi's General Theory of Crime: A Meta-Analysis.'' *Criminology* 38:931–964.

Pratt, Travis, Michael Turner, and Alex Piquero. 2004. ''Parental Socialization and Community Context: A Longitudinal Analysis of the Structural Sources of Low Self Control.'' *Journal of Research in Crime and Delinquency* 41:219–243.

Reckless, Walter. 1967. *The Crime Problem*. New York: Appleton Century Crofts.

Reisig, Michael D. and Travis C. Pratt. 2011. ''Low Self-control and Imprudent Behavior Revisited.'' *Deviant Behavior* 32:589–625.

Reiss, Albert. 1951. ''Delinquency as a Failure of Personal and Social Controls.'' *American Sociological Review* 16:196–207.

Schoepfer, Andrea and Alex Piquero. 2006. ''Self Control, Moral Beliefs, and Criminal Activity.'' *Deviant Behavior* 27:51–71.

Sherkat, Darren E. 2008. ''Beyond Belief: Atheism, Agnosticism, and Theist Certainty in the United States.'' *Sociological Spectrum* 28:438–459.

Spivak, Andrew L., Miyuki Fukushima, Margaret S. Kelley, and Tiffany Sanford Jenson. 2010. ''Religiosity, Delinquency, and the Deterrent Effects of Informal Sanctions.'' *Deviant Behavior* 32:677–711.

Stark, Rodney. 2008. *What Americans Really Believe*. Waco, TX: Baylor University Press.

Stark, Rodney and Roger Finke. 2000. *Acts of Faith: Explaining the Human Side of Religion*. Berkeley: University of California Press.

Steensland, Brian, Jerry Z. Park, Mark D. Regnerus, Lynn D. Robinson, W. Bradford Wilcox, and Robert D. Woodberry. 2000. ''The Measure of American Religion: Toward Improving the State of the Art.'' *Social Forces* 79:291–318.

Sykes, Gresham and David Matza. 1957. ''Techniques of Neutralization: A Theory of Delinquency.'' *American Sociological Review* 22:664–670.

Teasdale, Brent and Eric Silver. 2009. ''Neighborhoods and Self Control: Toward an Expanded View of Socialization.'' *Social Problems* 56:205–222.

Tittle, Charles and Ekaterina Botchkovar. 2005. ''The Generality and Hegemony of Self Control Theory: A Comparison of Russian and U.S. Adults.'' *Social Science Research* 34:703–731.

Tittle, Charles, David A. Ward, and Harold Grasmick. 2004. ''Capacity for Self Control and Individuals' Interest in Exercising Self Control.'' *Journal of Quantitative Criminology* 20:143–173.

Ulmer, Jeffery T. 2010. ''Religion as a Unique Cultural Influence on Crime and Delinquency: Expanding on Jang and Johnson's Agenda.'' Pp 163–171 in *Contemporary Issues in Criminological Theory and Research: The Role of Social Institutions*, edited by Richard Rosenfeld, Kenna Quinet, and Crystal Garcia. Belmont, CA: Wadsworth.

Vazsonyi, Alexander T. and Dusty D. Jenkins. 2010. ''Religiosity, Self-Control, and Virginity Status in College Students from the 'Bible Belt': A Research Note.'' *Journal for the Scientific Study of Religion* 49:561–568.

Walker, Carmella, Michael G. Ainette, Thomas A. Wills, and Don Mendoza. 2007. ''Religiosity and Substance Use: Test of an Indirect-Effect Model in Early and Middle Adolescence.'' *Psychology of Addictive Behaviors* 21:84–96.

Watt, Toni Terling and Jesse McCoy Rogers. 2007. ''Factors Contributing to Differences in Substance Use among Black and White Adolescents.'' *Youth and Society* 39:54–74.

Welch, Michael, Charles Tittle, and Harold Grasmick. 2006. ''Christian Religiosity, Self Control, and Social Conformity.'' *Social Forces* 84:1605–1623.

Wikstrom, Per-Olof and Kyle Treiber. 2007. ''The Role of Self Control in Crime Causation: Beyond Gottfredson and Hirschi's *General Theory of Crime*.'' *European Journal of Criminology* 4:237–264.

Wright, John, Kevin Beaver, Matt Delisi, and Michael Vaughn. 2009. ''Evidence of Negligible Parenting Influences on Self Control, Delinquent Peers, and Delinquency in a Sample of Twins.'' *Justice Quarterly* 25:544–569.

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