The Effects of Low Self-Control and Delinquent Peers on Alcohol, Tobacco, and Drug Use in a Sample of Saudi Arabian Youth

Kevin M. Beaver[1,2], Mohammed Said Al-Ghamdi[2], Ahmed Nezar Kobeisy[2], Fathiyah H. Alqurashi[2], Joseph A. Schwartz[3], Eric J. Connolly[4], and Jamie M. Gajos[1]

Abstract

A considerable amount of research has examined patterns of substance use and the potential explanations of it among samples from the United States and other industrialized nations. To date, however, no research has explored these issues in a sample of Saudi Arabian youth. The current study addressed this gap in the literature and examined the lifetime use of drugs, alcohol, and tobacco among Saudi Arabian youth. We also examined whether key measures from social learning theory and low self-control theory were able to account for patterns of usage. Data drawn from a sample of nearly 500 youth residing in Jeddah, Saudi Arabia, were used. Analysis of the data revealed that 12.7% of youth had smoked cigarettes at least 1 time, 2.6% had consumed alcohol at least once, and 3.0% had used illegal drugs. Moreover, the results of rare-events logistic regression revealed that a measure of delinquent peers was the strongest and most consistent predictor of substance use, while a measure of low self-control was unrelated (or related in a direction opposite to that which was predicted) to the measures of substance use.

[1]Florida State University, Tallahassee, USA
[2]King Abdulaziz University, Jeddah, Saudi Arabia
[3]University of Nebraska Omaha, Lincoln, USA
[4]Pennsylvania State University, Abington, USA

Corresponding Author:
Kevin M. Beaver, College of Criminology & Criminal Justice, Florida State University, 145 Convocation Way, 315C Eppes Hall, Tallahassee, FL 32306-1273, USA.
Email: kbeaver@fsu.edu

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There have been tens of thousands of studies conducted on the prevalence, causes, and consequences of drug, alcohol, and tobacco use among youth (King, Vidourek, & Merianos, 2013; Mathers, Toumbourou, Catalano, Williams, & Patton, 2006; Phillips, 2012; Stein, Newcomb, & Bentler, 1987; Terry-McElrath, O'Malley, & Johnston, 2009; Weichold, Wiesner, & Silbereisen, 2014). This voluminous body of research has provided some consistent findings, including that adolescents typically display the highest rates of substance use among all age groups (Kandel & Logan, 1984; Young et al., 2002), that an array of environmental factors correlate with and perhaps cause substance use (Brook et al., 2001; Johnson, Marcos, & Bahr, 1987), and that high usage rates of these substances have long-term deleterious health outcomes (Grant & Dawson, 1998; Kandel, Davies, Karus, & Yamaguchi, 1986; Moore et al., 2007). Despite the widespread knowledge regarding substance use among youth, there are still some important gaps in the extant literature. For example, one of the more salient omissions from the literature is whether these findings generalize to youth in other nations and societies where research on the causes and correlates of substance use are extremely limited. Empirical data on substance use is unequal across geographical regions and some of the largest gaps in this knowledge base surround Middle Eastern countries. Part of the reason for a general lack of knowledge on substance use and other behavioral outcomes in these countries stems from the fact that Middle Eastern countries are frequently inaccessible to researchers from other nations and they typically do not release statistics on the rate of substance use among citizens. As a result, only fragmented and limited data tend to be available on substance use among youth residing in the Middle East.

Not knowing whether the etiology and frequency of substance use in Western countries aligns with Middle Eastern countries represents an important gap in the current literature. Equally important, however, is the lack of information regarding the potential causes and correlates of substance use in these nations. To date, there exists no research examining whether different theoretical perspectives explain variation in substance use behaviors among youth from the Middle East. Against this backdrop, the purpose of this article is twofold. First, we examine the prevalence of lifetime usage of illegal drugs, alcohol, and tobacco use in a sample of youth from Jeddah, Saudi Arabia. Second, in an effort to elucidate the predictors of substance use, we examine whether key constructs derived from two of the most empirically supported criminological theories—social learning theory and low self-control theory—can explain variation in patterns of substance use among Saudi Arabian youth. In this way, the current study provides both descriptive information about substance use and, at the same time, begins to examine the theoretical constructs that might account for variation in substance use among a sample of Saudi Arabian youth. To our knowledge, this study will represent the first partial test of these theories on a sample of youth drawn from Saudi Arabia.

Patterns of Substance Abuse Among International Youth

Within the United States, rates of drug, alcohol, and tobacco use among adolescents tend to vary across time, but remain relatively high when compared against any other age group. As a direct result, much of the literature has focused on rates of substance use among this age group. Recent data, for instance, indicate that about 37% of American youth have used illicit drugs at least once during the past year, about 28% of youth have used tobacco during the past 30 days, and 44% of youth have consumed alcohol during the past 30 days (Johnston, O'Malley, Bachman, & Schulenberg, 2010). These prevalence rates are similar to those reported in other industrialized nations, though the precise estimates vary across nations. For example, rates of substance use tend to be highest for adolescents in Australia, Ireland, and the United Kingdom, whereas they tend to be lowest among adolescents residing in Belgium, France, and Spain (Smart & Ogborne, 2000). Given that the use of some of these substances has been linked to serious negative developmental outcomes, such as dropping out of school (Mensch & Kandel, 1988), experiencing unstable social relationships (Newcomb & Bentler, 1988), engaging in risky sexual behaviors (Cooper, 2002), and even elevated risk of premature death (Grunbaum et al., 2002; Swahn & Bossarte, 2007), there remains a significant amount of interest in charting and understanding patterns of substance abuse among youth across other, less accessible nations.

Although a significant amount of research has focused on substance use rates among youth from industrialized nations, comparatively much less research has been devoted to examining adolescent substance use from other nations, particularly those in the Middle East. One such nation that has not been the focus of much empirical research is Saudi Arabia. While Saudi Arabia is a heterogeneous nation, the limited available evidence bearing on this nation suggests that substance use rates among its citizens are comparable with those of other nations. For instance, the rate (per 1,000 residents) of injecting drug users in Saudi Arabia has been estimated to be between 15 and 26, which places it on par with nations such as Croatia, Hungary, and Portugal (Aceijas, Stimson, Hickman, & Rhodes, 2004). In addition, trends in fatal overdose rates among Saudis are similar to rates found in the United Kingdom and Australia, where opioid overdoses account for approximately 47% of all overdose deaths (Elfawal, 1999; Hall, Lynskey, & Degenhardt, 2000). Moreover, in an effort to provide additional details on drug use in Saudi Arabia, Hafeiz (1995) examined substance use patterns within a sample of Saudi Arabian drug users. The results revealed that 49% of the sample used heroin, 31% consumed alcohol, 26% used marijuana, and 10% were users of inhalants. With regard to drug use among racial and ethnic minority groups in Saudi Arabia, the evidence suggests that minority groups are less likely to engage in drug use. Other research examining the distribution of substance overdose fatalities among different ethnic groups within Saudi Arabia has revealed South Asians, East Asians, and Westerners to account for 9%, 7.5%, and 3% (respectively) of the total number of overdose fatalities, whereas Saudis accounted for 77% of the total number of overdose fatalities (Elfawal, 1999). Collectively, the available evidence suggests

that substance use is prevalent in Saudi Arabia and that the types of substances used in these nations is similar to that of some other industrialized nations.

The data on substance use rates from Saudi Arabia, however, must be viewed with caution. In addition to the fact that data collected and released by Saudi Arabia has not been fully evaluated for its credibility, the usage rates that have been published tend to be outdated, culled from questionable sources or methodologies, or do not allow for a thorough examination of adolescent usage rates from various substances. Against this backdrop, there are at least three main reasons to examine the patterns of substance abuse among youth residing in Saudi Arabia. First, for the most part, relatively little is known about usage rates among Saudi Arabians, and Saudi Arabian youth in particular. Second, the laws governing the use of drugs, alcohol, and tobacco are quite different in Saudi Arabia compared with other industrialized nations. Specifically, drug and alcohol use are illegal and the penalties for possession, use, and distribution can be quite severe. Youth who are caught using drugs or consuming alcohol, for example, are subject to a minimum punishment of 2 years of incarceration, whereas drug smugglers can face the death penalty. Tobacco use, in contrast, is legal and there is no minimum age to purchase, possess, or use tobacco making it is quite possible that rates of tobacco use, in contrast to the rates of alcohol and drug use, are comparatively higher among Saudi Arabian youth. To date, though, a lack of research on this possibility precludes any type of firm conclusion. Third, Saudi Arabian culture, which is grounded in the Islamic faith, is tremendously different from the culture in virtually every other industrialized nation. Given that cultural variables have been shown to influence substance use among adolescents (Au & Donaldson, 2000; Unger et al., 2002), it would be interesting to determine whether rates of substance use vary in a nation with a substantially different set of cultural values and influences. Taken together, the unique legal, cultural, and socialization elements of Saudi Arabia are quite different from those that are typically studied by criminologists and, as a result, it is quite possible that the rates of substance use in Saudi Arabia differ significantly from those in other nations.

Theoretical Explanations to Explain Substance Use Behaviors in Saudi Arabian Youth

In addition to the lack of information regarding adolescent substance use, there is also a lack of research examining what might account for variation in substance use among Saudi Arabian youth. Based on the findings from studies analyzing samples of adolescents from the United States and from other industrialized nations, two of the most powerful explanations of antisocial behaviors, including substance use, are social learning theory (Akers, 1998) and Gottfredson and Hirschi's (1990) self-control theory (Pratt & Cullen, 2000; Pratt et al., 2010).[1] These two theories were selected to examine substance use in Saudi Arabian youth because they have (a) been shown to have empirical support in some international samples (Hartjen & Priyadarsini, 2003; Hwang & Akers, 2003; Vazsonyi & Belliston, 2007; Vazsonyi, Pickering, Junger, &

Hessing, 2001; Vazsonyi, Wittekind, Belliston, & Van Loh, 2004) and (b) because they were designed to be general theories of crime and antisocial behavior and so they should have application to samples derived from all different types of nations.

Briefly, social learning posits that all behaviors, including antisocial behaviors (e.g., drug use), are learned from others. In an effort to better specify learning processes, differential reinforcement is also emphasized in social learning theory (Akers, 2001), such that behaviors that are reinforced by reward or the avoidance of discomfort are more likely to persist. The measure most commonly used to assess social learning theory is a measure assessing the degree of contact that adolescents have with delinquent peers. Self-control theory, in contrast, argues that committing crime and analogous behaviors, such as smoking cigarettes and drinking alcohol, is caused by two factors: variation in levels of self-control and criminal opportunity. For the most part, criminal opportunity is assumed to be a constant and so the most salient factor in the etiology of crime is low levels of self-control. Low levels of self-control, in general, typically are associated with a greater likelihood of engaging in antisocial behaviors. Levels of self-control have been found to remain relatively stable throughout extended periods of the life course (Arneklev, Cochran, & Gainey, 1998; Beaver & Wright, 2007; Polakowski, 1994; Turner & Piquero, 2002), although support has also been found for changes in levels of self-control within some samples (Mitchell & MacKenzie, 2006). The measures most commonly used to assess self-control theory are behavioral and attitudinal self-control scales. Collectively, these two theories represent the most commonly tested theories of crime during the past couple of decades, generating hundreds of studies assessing the veracity of the key constructs in a wide range of heterogeneous samples. The results of these studies were examined in two meta-analyses (Pratt & Cullen, 2000; Pratt et al., 2010) and the results of these meta-analyses revealed that measures derived from social learning theory and self-control are among the strongest and most consistent predictors of crime and antisocial behaviors.

While the results of these meta-analyses provide strong support for these two theoretical perspectives, the studies included in the meta-analyses were garnered largely from samples drawn from the United States and other industrialized nations. As a result, whether the effects of social learning and self-control variables on measures of crime and analogous behaviors are generalizable to other nations remains unresolved. There are, however, a limited number of studies testing social learning theory and self-control theory on samples collected internationally. For example, Vazsonyi and his colleagues (2001) examined the association between levels of self-control and deviance in adolescents from four nations: Hungary, the Netherlands, Switzerland, and the United States. The results of this study revealed that the measure of self-control was a statistically significant predictor of deviance in all four nations. In another study, the relationship between social learning and delinquency was examined in a sample of French youth (Hartjen & Priyadarsini, 2003). The findings revealed that measures of social learning theory were strongly related to delinquency for both males and females. Other studies using international samples have also found support for both social

learning theory (Hwang & Akers, 2003) and self-control theory (Rebellon, Straus, & Medeiros, 2008; Vazsonyi & Belliston, 2007; Vazsonyi et al., 2004).

The applicability of self-control theory and social learning theory to explaining deviance and criminal behaviors among diverse populations has also been found. For example, robust associations between low self-control and violent and property crimes have been detected in both Western and non-Western cultures (Rebellon et al., 2008) and among drug-using adult and juvenile offenders within the United States (Longshore, Rand, & Stein, 1996). Support for the association between low self-control and deviance among adolescent minority populations (Vazsonyi & Crosswhite, 2004) and among middle school students with attention deficit hyperactivity disorder (ADHD; Unnever, Cullen, & Pratt, 2003) has also been revealed. Tests of social learning theory have been used to explain a number of outcomes among diverse populations, where various components of the theory (e.g., association, reinforcement, and definitions) have been shown to predict adolescent smoking behaviors (Akers & Lee, 1996), adolescent alcohol use (Ary, Tildesley, Hops, & Andrews, 1993), and adolescent sexual behaviors (Benda, DiBlasio, & Kashner, 1994). Furthermore, the applicability of social learning theory has been extended to explain drinking behaviors among elderly populations (Akers, La Greca, Cochran, & Sellers, 1989) and among Irish adolescent populations (Grube, Morgan, & Seff, 1989). Components of social learning theory are also predictive of serious delinquency among juvenile offenders (Reinarman & Fagan, 1988) and intimate partner violence among university students in married and dating relationships (Sellers, Cochran, & Branch, 2005). Despite this line of evidence suggesting that both social learning and self-control perspectives have applicability to both diverse and international samples, there are no studies that have examined these theoretical perspectives with a sample drawn from Saudi Arabia.

The Current Study

The purpose of this study is twofold. First, we examine the use of drugs, alcohol, and tobacco in a sample of youth residing in Jeddah, Saudi Arabia. Jeddah is the largest province in the region of Makkah al-Mukarramah and is the most populated region in Saudi Arabia. According to most recent estimates, there are nearly 7 million people residing in this area, accounting for approximately 25% of the entire population of Saudi Arabia. Occupants of Jeddah are comprised of both Saudi and non-Saudi ethnic groups, with approximately 78% of the population under the age of 40 years old. Furthermore, the number of males slightly exceeds the number of females within the population (Jeddah Chamber of Commerce and Industry, 2009).

Second, we examine whether key constructs drawn from social learning theory and from self-control theory are able to predict variation in the use of drugs, alcohol, and tobacco among Saudi Arabian youth. In doing so, we pit these two theoretical perspectives against each other, and while they are frequently viewed as being incompatible (Hirschi & Gottfredson, 1993), the key constructs from these two theories are not necessarily mutually exclusive. We now turn to a discussion of the unique data set that we use to address these issues.

Method

Data

Data for this study come from a sample of Saudi Arabian youth collected in 2014. Specifically, self-report surveys were distributed to male and female students attending a school in Jeddah, Saudi Arabia. This school is typical to most other schools in Saudi Arabia and is supported by the government.[2] Only students who were either Saudi nationals or who resided in Jeddah were eligible for participation in the study. Students were required to obtain permission from their parents prior to completing the survey and were then instructed that their participation was completely voluntary and that they could withdraw from the study at any time. Students completed the surveys in a self-report fashion, but they could also request assistance from their teachers for clarification over the data collection process or confusion over any words/meanings in the questionnaires. Overall, of the 800 youth who were asked to participate in the survey, 494 youth actually participated and submitted usable questionnaires for a response rate of 61.75%. The surveys were originally prepared in English, then translated into Arabic, and then translated back to English. Each translation was reviewed at least 2 times by research team members fluent in both languages to ensure the following: (a) the accuracy of the translation and that the surveys in Arabic measured the intended area without any distortion, and (b) the cultural appropriateness of the items attempted for measurement by the surveys. The survey instruments and data collection plan was reviewed and approved of the Institutional Review Board (IRB) at King Abdulaziz University.

Measures

Substance use measures. A total of four substance use measures were included in the analyses as outcome measures. Specifically, youth were asked to indicate whether they had ever (a) smoked a cigarette, (b) drank alcohol, and/or (c) used illegal drugs. Each of these items was coded dichotomously, where 0 = no and 1 = yes. The fourth substance use measure was created by summing together the responses for each of the three individual substance use measures. This combined measure of substance use, which was called the "polysubstance user," measures the diversity of substances used by each respondent. For this index, values ranged between zero and three, with a score of zero indicating complete abstinence from all substances and a score of three indicating the use of each substance at least once during their lifetime.

Delinquent peers. A three-item delinquent peers scale was created by using items that are similar to those that have been used in previous research (Beaver, Wright, & DeLisi, 2008). In particular, youth were asked to indicate how many of their closest friends (a) smoke cigarettes, (b) use illegal drugs, and (c) belong to a gang. The response set for these items was as follows: 0 = none of them, 1 = some of them, 2 = most of them, and 3 = all of them. Responses to these items were then summed together to create the delinquent peers scale where higher scores represent more contact with delinquent

peers (α = .62). Importantly, no respondents received a score of 7 or 8 on this scale and, as a result, the respondents who scored a 9 on this scale were recoded as a 7. Using this procedure helps ensure that all data points estimated were based on observable cases. The end result is that the delinquent peers scale ranged between 0 and 7.

Low self-control. Low self-control was measured using the scale developed by Grasmick, Tittle, Bursik, & Arneklev (1993). Specifically, youth were asked 24 questions that were designed to tap individual variation in levels of self-control. Youth, for instance, were asked to indicate whether they lose their temper easily, whether they frequently avoid projects that they know will be difficult, and whether they sometimes take risks just for the fun of it. The response set for these questions was as follows: 1 = strongly disagree, 2 = somewhat disagree, 3 = somewhat agree, and 4 = strongly agree. Responses to the items were then summed to create the low self-control scale where higher values represented lower levels of self-control (α = .93).

Control variables. Three control variables were included in all models in the analysis: gender, age, and nationality. Gender was coded dichotomously (0 = female, 1 = male), age was measured in years, and nationality was coded dichotomously (0 = non–Saudi Arabian, 1 = Saudi Arabian).

Plan of Analysis

The analyses for this study followed a series of interrelated steps. First, the descriptive statistics for the key substance use scales will be analyzed. The descriptive statistics are of considerable importance because of the lack of research examining substance use behaviors in Saudi Arabian youth. Second, rare-events logistic regression models will be estimated to examine the potential associations between delinquent peers and low self-control and the three dichotomously coded substance use measures. Rare-events logistic regression will be used given that the outcomes of interest are relatively rare and, as a result, using logistic regression can produce biased estimates (see King & Zeng, 2001, for more details; for a criminological example using rare-events logistic regression see Piquero, MacDonald, Dobrin, Daigle, & Cullen, 2005). Third, a Poisson regression model will be estimated to examine the influence of delinquent peers and low self-control on the polydrug user measure.

The final analytic sample consisted of participants who had complete information for all of the covariates included in each statistical model (using listwise deletion). This process produced a sample size that ranged between *N* = 352 and 365 for the multivariate models. We further investigated the source of the missing data and found that for seven of the eight covariates, less than 10% of the cases were missing. For the low self-control scale, however, about 17% of the sample was missing data on that particular scale. In an attempt to determine whether the data were systematically missing, we compared those respondents who had no missing data to those respondents who were removed from at least one of the statistical models. The results revealed that only two of the covariates were related to missingness: gender and cigarette use. Specifically, males were more

Table 1. Descriptive Statistics for Study Variables and Scales.

	Frequency	%
Cigarette user		
No	427	87.3
Yes	62	12.7
Alcohol user		
No	456	97.4
Yes	12	2.6
Illegal drug user		
No	454	97.0
Yes	14	3.0
Polysubstance user		
None	383	84.9
One	57	12.6
Two	5	1.1
Three	6	1.3
Gender		
Male	290	59.9
Female	194	40.1
Nationality		
Saudi Arabian	456	96.4
Non–Saudi Arabian	17	3.6

	M	Median	SD
Delinquent peers	0.67	0.00	1.21
Low self-control	57.23	59.00	15.03
Age	16.27	16.00	1.24

likely than females to be included in the final analytic sample and cigarette users were more likely than non-users to be included in the final analytic sample.

Results

The analysis for this study began by analyzing the descriptive statistics for the variables and scales used in the analysis. As Table 1 shows, 12.7% of the sample indicated that they had smoked at least one cigarette during their lifetime. In addition, 2.6% of the sample revealed that they had consumed alcohol during their lifetime and another 3.0% revealed that they had used illegal drugs at least once during their life. The table also shows that 84.9% of all youth completely refrained from any type of substance, 12.6% indicated that they had used at least one substance, 1.1% of youth indicated that they had used at least two substances, and 1.3% indicated that they had used all three substances at least once during their life. These rates of alcohol and illegal drug use are quite low, but keep in mind that alcohol is illegal in Saudi Arabia and punishment for

Table 2. Rare-Events Logistic Regression Models Predicting Lifetime Usage of Cigarettes, Alcohol, and Illegal Drugs.

Covariates	Cigarette user			Alcohol user			Illegal drug user		
	b	SE	OR	b	SE	OR	b	SE	OR
Theoretically relevant scales									
Delinquent peers	1.34	0.18	3.82*	0.44	0.14	1.55*	0.86	0.20	2.36*
Low self-control	0.02	0.02	1.33	−0.03	0.02	0.97	−0.10	0.04	0.91*
Control variables									
Gender	0.33	0.43	1.39	0.73	0.93	2.08	−0.65	0.82	0.52
Age	0.45	0.16	1.57*	0.03	0.30	1.03	1.13	0.42	3.10*
Nationality	−1.07	0.85	0.34	−2.30	1.02	0.10	−2.36	1.13	0.09*
n		365			352			353	

*Indicates that the covariate is significant at the .05 level, two-tailed test.

illegal drugs are quite punitive. Based on the fact that alcohol and drugs are illegal, it is also expected that obtaining such substances would be more difficult than in other nations with more relaxed policies regarding substance use. Table 1 also provides information about the control variables used in the analyses as well as the distribution of the delinquent peers and low self-control scales.

We next turn to Table 2 which shows the results of the binary logistic regression models predicting the three substance use measures. The first model displays the results for the lifetime cigarette user. As can be seen, the delinquent peers scale emerged as a significant predictor of cigarette use (odds ratio [OR] = 3.82, $p < .05$), but the low self-control scale did not (OR = 1.33, $p > .05$). The only other covariate to be significantly associated with cigarette use was age (OR = 1.57, $p < .05$). The results of the second model, which used lifetime alcohol user as the outcome measure, were largely consistent with the previous model. Once again, the delinquent peers scale exerted a statistically significant and positive effect on alcohol use (OR = 1.55, $p < .05$), but the self-control scale did not (OR = .97, $p > .05$). No other covariate in the model was a significant predictor of alcohol use. The last model of the table used the lifetime illegal drug user as the outcome measure. For this model, both the delinquent peers scale (OR = 2.36, $p < .05$) and the low self-control scale (OR = 0.91, $p < .05$) significantly predicted the odds of using illegal drugs, as did age (OR = 3.10, $p < .05$) and nationality (OR = .09, $p < .05$). Of interest, however, was the effect of low self-control. Specifically, the relation between low self-control and illegal drug use was in the opposite directions from what would be predicted; that is, respondents with lower levels of self-control were less likely to use illegal drugs.[3] We revisit this novel finding later.

Our last analysis examined the effects of the delinquent peers scale and the low self-control scale on the polysubstance use measure. The results of a likelihood-ratio test revealed that a Poisson model was favored over a negative binomial model. The results of the Poisson model (presented in the Notes of Figure 1) revealed that the delinquent peers scale was a significant predictor of the polysubstance use measure
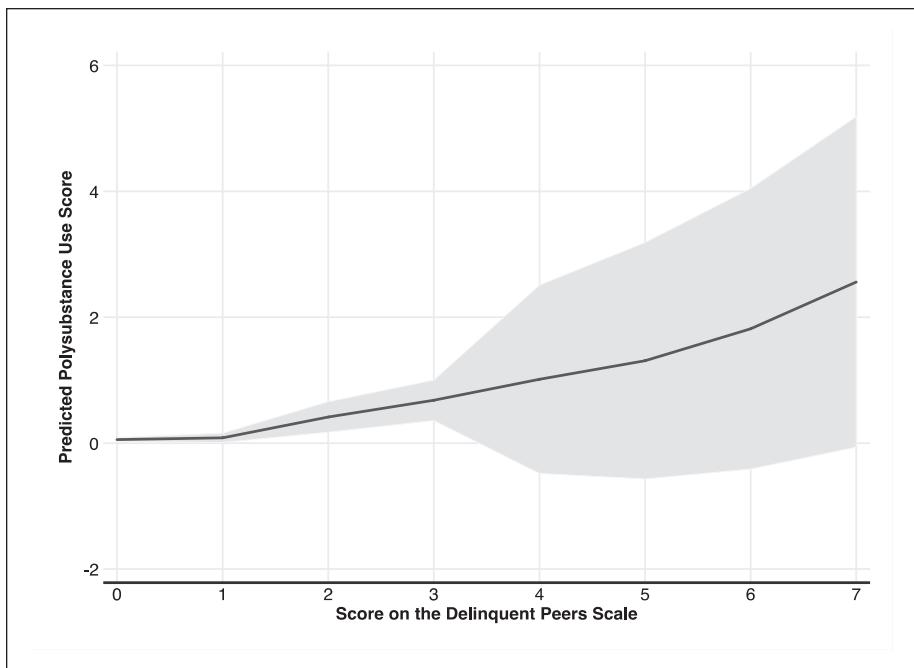
Figure 1. Predicted scores on the polysubstance user measure as a function of delinquent peers.

Note. Predicted composite substance use scores calculated with all model covariates held at their means. Coefficients from the estimated Poisson regression model: delinquent peers (coefficient = .55; *SE* = .06; *p* < .05), low self-control (coefficient = .00; *SE* = .01; *p* > .05), gender (coefficient = .21; *SE* = .31; *p* > .05), age (coefficient = .05, *SE* = .01; *p* < .05), and Nationality (coefficient = −2.38, *SE* = .94; *p* < .05).

(coefficient = .55, *p* < .05), but that the low self-control scale was not (coefficient = .00, *p* > .05). To provide a more intuitive understanding of the magnitude of this effect, the predicted event scores, along with the accompanying 95% confidence intervals (CIs), were plotted as a function of scores on the delinquent peers scale while holding all other measures at their means. As can be seen, the predicted probability of substance use increased as the delinquent peers measure increased. The predicted event score for youth with a score of 0 on the delinquent peers measure was .06. Conversely, the predicted event score for youth with the maximum score on the delinquent peers measure (7) was 2.56, indicating that these youth were predicted to have used more than two of the examined substances when reporting the highest level of delinquent peer association.

Discussion

A significant amount of research has focused on patterns of the use of drugs, alcohol, and tobacco by adolescents and the various theoretical perspectives that are able to

account for patterns of substance use (Akers, 1998; Ennett et al., 2006; King et al., 2013; Weichold et al., 2014; Wills & Dishion, 2004). The overwhelming majority of this research, however, has focused on adolescents residing in the United States and other industrialized nations. The current study was designed to address this gap in the literature by examining rates of drug, alcohol, and cigarette use among a sample of adolescents residing in Jeddah, Saudi Arabia, and by also examining whether key constructs from social learning and self-control theories were able to explain substance use among Saudi Arabian youth. Analyses of the data revealed three key findings.

First, the analyses revealed that 12.7% of Saudi Arabian youth residing in Jeddah had smoked cigarettes at least 1 time during their lifetime.[4] Depending on the data source and the time period examined, these estimates are either on par with or lower than those reported in the United States (Apelberg et al., 2014; Arrazola, Kuiper, & Dube, 2014; Arrazola, Neff, Kennedy, Holder-Hayes, & Jones, 2014; Johnston et al., 2010). In addition, lifetime use of alcohol and other illegal drugs was 2.6% and 3.0%, respectively. These prevalence estimates are significantly lower than what has typically been reported in the United States (Swendsen et al., 2012), where 59.8% of adolescents between the ages of 13 and 18 report a lifetime prevalence of alcohol use, and 24.4% report a lifetime use of illicit drugs. The factors that account for these differences between the rates of substance use for Saudi Arabian youth versus youth from other industrialized nations are not easily discernible, but we offer two possibilities. To begin with, the cultural elements found in Saudi Arabia are quite different from those in Western nations, with much of their daily life routines revolving around their Islamic faith. Given that Islam prohibits the use of drugs and alcohol consumption, it is quite possible that these cultural and religious beliefs account for significantly lower rates of drugs and alcohol among Saudi Arabian youth. Although in the United States the underage consumption of alcohol is illegal, it remains relatively commonplace and is not typically viewed as a harbinger of future serious misconduct. In Saudi Arabia, however, youth who consume alcohol are not only violating the law, but they are also engaging in a behavior that is an affront to their God.[5] Against this backdrop, it is possible that only the most serious and chronic antisocial youth would consume alcohol in Saudi Arabia. The other potential explanation for these lower rates stems from the implementation of laws in Saudi Arabia that govern the use of drugs and alcohol. Drugs and alcohol are illegal to use, possess, and distribute in Saudi Arabia. Penalties for violating these rules can be quite severe, particularly for distributing drugs where the penalty can be death. Consequentially, the availability of drugs and alcohol is much more limited in Saudi Arabia than in other industrialized nations and the severe sanctions associated with both use and possession of both may deter youth from attempting to use them. Future research is needed to more fully understand what accounts for the disparate rates of use of these substances for youth in Saudi Arabia and youth in other parts of the world.

The second main finding to emerge from the analyses was that the key measure of social learning theory—that is, delinquent peers—was a statistically significant and robust predictor of drug, alcohol, and cigarette use among Saudi Arabian youth. Indeed, this was the only measure that was related to all three measures of substance

use and the polysubstance use measure. These findings dovetail with most of the existing empirical criminological research which shows that measures of delinquent peers represent the most consistent predictors of virtually every antisocial behavior ever studied (Pratt et al., 2010). If this finding can be replicated in the future with independent samples from Saudi Arabia and other Middle Eastern nations, then it would seem plausible to conclude that social learning theory is involved in explaining patterns of adolescent substance use in non-industrialized nations, too.

The last main finding to be culled from the current study centers on the lack of empirical support for self-control theory. The measure of low self-control was a non-significant predictor of cigarette and alcohol use. For illegal drug use, the measure of low self-control was statistically significant, but the association was in the opposite direction of what was predicted; that is, higher levels of self-control increased the odds of using illegal drugs. Given the significant amount of support for the link between low levels of self-control and antisocial behaviors (Pratt & Cullen, 2000), even in international samples (Vazsonyi & Belliston, 2007; Vazsonyi et al., 2001), we are left to speculate as to why the measure of self-control did not predict substance use in Saudi Arabian youth. One possible explanation is that there is something unique about Saudi Arabian culture that eliminates the association between levels of self-control and antisocial behavior. Precisely what that might be is not immediately obvious, but could center on the cultural values and norms or the strict adherence to Islamic teachings, to name just a couple of possibilities. A more realistic explanation, however, is that the measure of self-control does not adequately capture variation in self-control among Saudi Arabian youth. Although we measured self-control with the widely used Grasmick et al. (1993) scale, it is very possible that this scale does not have the same predictive ability in youth from Saudi Arabia or it simply does not represent a valid way to measure variation in self-control. We explored this possibility by examining closely the distributional properties of the self-control scale. Unlike research conducted on U.S. samples, the distribution of the low self-control scale was bimodal, with 10.0% of the sample receiving a score of 24 on the scale and 23.9% of the sample receiving a score of 72 on the scale. These values are important because they indicate that 10% of the youth responded "strongly disagree" on every item measuring low self-control and that 23.9% of the youth responded "somewhat agree" on every item measuring low self-control. Perhaps these response patterns were governed, in part, by cultural expectations. If respondents who had these two scores were removed from the data, then the distribution of the low self-control scale approximated normality. We thus reanalyzed the statistical models by removing respondents with these scores from the analyses and the findings remained virtually identical. Future research, therefore, should begin to examine more closely whether the Grasmick et al.'s scale is an appropriate way to measure self-control in Saudi Arabian samples and whether there are alternative measures that would be more reliable and valid ways to measure self-control in Saudi Arabian youth.

There are a number of limitations with the current study that should be addressed in future studies. First, the data are cross-sectional and so it is impossible to establish temporal order and thus causality. Future research would benefit greatly by collecting

longitudinal data from Saudi Arabia or other Middle Eastern nations. Second, youth who were included in the sample were selected from only one city: Jeddah. Cities in Saudi Arabia, however, are quite heterogeneous and some of the cities, such as Jeddah, are comparatively more progressive and liberal than other cities, such as Riyadh. Caution should thus be exercised in extrapolating the findings from this study to all parts of Saudi Arabia until the results can be replicated in samples that are drawn from other areas of Saudi Arabia. Third, measures from only two criminological theories were included in the data and thus whether some of the key measures from other criminological theories, such as social bonding theory and strain theory, would be able to account for patterns of substance use in Saudi Arabian youth remains an open-empirical question. It should also be noted that only one measure for each of the two theories was included in the study. This necessarily means that the analyses do not provide a complete test of each theory (e.g., only examining one aspect of social learning theory: differential association). Future research should conduct more comprehensive tests of criminological studies in Middle Eastern nations to determine the robustness of these findings. Fourth, given that the consumption of alcohol and the use of illegal drugs is socially inappropriate and can potentially result in serious punitive sanctions, the use of self-reports may bias the findings in unknown ways. Youth, for example, may under-report their use of these substances as a way to avoid detection and stigmatization. The true extent of this potential problem, however, could not be examined in the current study.

The use and abuse of substances, such as alcohol and drugs, can have serious and long-lasting negative effects on the lives of youth. Fortunately, as more becomes known about patterns of substance use by youth, the types of substances that are being used by youth, and the correlates and potential causes of adolescent substance use, that knowledge can be used to devise more effective programs designed to prevent substance use and abuse. In nations where there is a lack of information about adolescent substance use, such as Saudi Arabia, programs are unable to be guided by the empirical literature. The current study, however, provided some of the first empirical evidence regarding substance use among Saudi Arabian youth, and hopefully it will spark future research to examine substance use and other antisocial behaviors in nations that have historically been overlooked in the criminological literature.

Notes

1. In consideration of space limitations, we do not provide detailed discussions of these two theories. Given that they are two of the most examined theories, and have been the subject of considerable scholarship, we point the interested reader to references discussing these theories in greater detail.
2. Detailed information about the school is not available for release to ensure anonymity of the school in the study and the participants who participated in the study, but the characteristics of the school, including the distribution of demographics is similar to what is found in other schools in Saudi Arabia.
3. A reviewer pointed out that the effect of the low self-control scale might be eliminated by the inclusion of the delinquent peers scale in the same statistical models. As a result, we reestimated the models separately for the low self-control scale and the delinquent peers scale. The pattern of significant effects was identical to those models that include both the self-control and the delinquent peers scales. Moreover, we also examined whether collinearity might be affecting the models by examining a bivariate correlation between the low self-control scale and the delinquent peers scale. The results of a bivariate correlation revealed that there was no significant association between them ($r = .04$, $p > .05$). This nonsignificant association also indicates that, at least in this sample, there does not appear to be a selection effect into delinquent peer networks that is attributable to low levels of self-control. Finally, we also examined variance inflation factors and tolerance for each of the multivariate equations and the results revealed no evidence of collinearity or multicollinearity. We also tested for multiplicative interactions between the delinquent peers scale and the low self-control scale. The results of these analyses revealed no significant interactions between these two scales in the prediction of any of the substance use measures.
4. A reviewer pointed out that public campaigns aimed to educate youth about the health risks associated with tobacco use are widespread in the United States and may have accounted for reductions in the use of tobacco. Although the health risks associated with tobacco use are advertised in Saudi Arabia, there has not been nearly as widespread and visible a public education campaign about tobacco in Saudi Arabia as there has been in the United States.
5. We thank an anonymous reviewer for bringing this important point to our attention.

References

Aceijas, C., Stimson, G. V., Hickman, M., & Rhodes, T. (2004). Global overview of injecting drug use and HIV infection among injecting drug users. *AIDS*, *18*, 2295-2303.

Akers, R. L. (1998). *Social learning and social structure: A general theory of crime and deviance*. Boston, MA: Northeastern University Press.

Akers, R. L. (2001). Social learning theory. In R. Paternoster & R. Bachman (Eds.), *Explaining criminals and crime: Essays in contemporary criminological theory* (pp. 192-210). Los Angeles, CA: Roxbury.

Akers, R. L., La Greca, A. J., Cochran, J., & Sellers, C. (1989). Social learning theory and alcohol behavior among the elderly. *The Sociological Quarterly*, *30*, 625-638.

Akers, R. L., & Lee, G. (1996). A longitudinal test of social learning theory: Adolescent smoking. *Journal of Drig Issues*, *26*, 317-343.

Apelberg, B. J., Corey, C. G., Hoffman, A. C., Schroeder, M. J., Husten, C. G., Caraballo, R. S., & Backinger, C. L. (2014). Symptoms of tobacco dependence among middle and high school tobacco users: Results from the 2012 national youth tobacco survey. *American Journal of Preventive Medicine*, *47*, S4-S14.

Arneklev, B. J., Cochran, J. K., & Gainey, R. R. (1998). Testing Gottfredson and Hirschi's "low self-control" stability hypothesis: An exploratory study. *American Journal of Criminal Justice*, *23*, 107-127.

Arrazola, R. A., Kuiper, N. M., & Dube, S. R. (2014). Patterns of current use of tobacco products among US high school students for 2000–2012—Findings from the National Youth Tobacco Survey. *Journal of Adolescent Health*, *54*, 54-60.

Arrazola, R. A., Neff, L. J., Kennedy, S. M., Holder-Hayes, E., & Jones, C. D. (2014). Tobacco use among middle and high school students—United States, 2013. *Morbidity and Mortality Weekly Report*, *63*, 1021-1026.

Ary, D. V., Tildesley, E., Hops, H., & Andrews, J. (1993). The influence of parent, sibling, and peer modeling and attitudes on adolescent use of alcohol. *Substance Use & Misuse*, *28*, 853-880.

Au, J. G., & Donaldson, S. I. (2000). Social influences as explanations for substance use differences among Asian-American and European-American adolescents. *Journal of Psychoactive Drugs*, *32*, 15-23.

Beaver, K. M., & Wright, J. P. (2007). The stability of low self-control from kindergarten through first grade. *Journal of Crime and Justice*, *30*, 63-86.

Beaver, K. M., Wright, J. P., & DeLisi, M. (2008). Delinquent peer group formation: Evidence of a gene x environment correlation. *The Journal of Genetic Psychology*, *169*, 227-244.

Benda, B. B., DiBlasio, F. A., & Kashner, T. M. (1994). Adolescent sexual behavior: A path analysis. *Journal of Social Service Research*, *19*, 49-69.

Brook, J. S., Brook, D. W., De La Rosa, M., Whiteman, M., Johnson, E., & Montoya, I. (2001). Adolescent illegal drug use: The impact of personality, family, and environmental factors. *Journal of Behavioral Medicine*, *24*, 183-203.

Cooper, M. L. (2002). Alcohol use and risky sexual behavior among college students and youth: Evaluating the evidence. *Journal of Studies on Alcohol*, *14*(Suppl.), 101-117.

Elfawal, M. A. (1999). Trends in fatal substance overdose in eastern Saudi Arabia. *Journal of Clinical Forensic Medicine*, *6*, 30-34.

Ennett, S. T., Bauman, K. E., Hussong, A., Faris, R., Foshee, V. A., Cai, L., & DuRant, R. H. (2006). The peer context of adolescent substance use: Findings from social network analysis. *Journal of Research on Adolescence*, *16*, 159-186.

Gottfredson, M., & Hirschi, T. (1990). *A general theory of crime*. Stanford, CA: Stanford University Press.

Grant, B. F., & Dawson, D. A. (1998). Age of onset of drug use and its association with DSM-IV drug abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey. *Journal of Substance Abuse*, *10*, 163-173.

Grasmick, H. G., Tittle, C. R., Bursik, R. J., & Arneklev, B. J. (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.

Grube, J. W., Morgan, M., & Seff, M. (1989). Drinking beliefs and behaviors among Irish adolescents. *International Journal of the Addictions*, *24*, 101-112.

Grunbaum, J. A., Kann, L., Kinchen, S. A., Williams, B., Ross, J. G., Lowry, R., & Kolbe, L. (2002). Youth risk behavior surveillance—United States, 2001. *Journal of School Health*, *72*, 313-328.

Hafeiz, H. B. (1995). Socio-demographic correlates and patterns of drug abuse in Eastern Saudi Arabia. *Drug and Alcohol Dependence*, *38*, 255-259.

Hall, W., Lynskey, M., & Degenhardt, L. (2000). Trends in opiate-related deaths in the United Kingdom and Australia, 1985–1995. *Drug and Alcohol Dependence*, *57*, 247-254.

Hartjen, C. A., & Priyadarsini, S. (2003). Gender, peers, and delinquency: A study of boys and girls in rural France. *Youth & Society*, *34*, 387-414.

Hirschi, T., & Gottfredson, M. R. (1993). Commentary: Testing the general theory of crime. *Journal of Research in Crime and Delinquency*, *30*, 47-54.

Hwang, S., & Akers, R. L. (2003). Substance use by Korean adolescents: A cross-cultural test of social learning, social bonding, and self-control theories. In R. L. Akers & G. F. Jensen (Eds.), *Social learning theory and the explanation of crime* (pp. 39-63). Piscataway, NJ: Transaction Publishers.

Jeddah Chamber of Commerce and Industry. (2009). *Jeddah guide—Facts and figures*. Retrieved from http://www.jeg.org.sa/data/modules/contents/uploads/infopdf/1090.pdf

Johnson, R. E., Marcos, A. C., & Bahr, S. J. (1987). The role of peers in the complex etiology of adolescent drug use. *Criminology*, *25*, 323-340.

Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2010). *Demographic subgroup trends for various licit and illicit drugs, 1975–2009* (Monitoring the Future Occasional Paper Series, Paper no. 73). Ann Arbor, MI: Institute for Social Research.

Kandel, D. B., Davies, M., Karus, D., & Yamaguchi, K. (1986). The consequences in young adulthood of adolescent drug involvement: An overview. *Archives of General Psychiatry*, *43*, 746-754.

Kandel, D. B., & Logan, J. A. (1984). Patterns of drug use from adolescence to young adulthood: I. Periods of risk for initiation, continued use, and discontinuation. *American Journal of Public Health*, *74*, 660-666.

King, G., & Zeng, L. (2001). Explaining rare events in international relations. *International Organization*, *55*, 693-715.

King, K. A., Vidourek, R. A., & Merianos, A. L. (2013). Sex and grade level differences in lifetime nonmedical prescription drug use among youth. *Journal of Primary Prevention*, *34*, 237-249.

Longshore, D., Rand, S. T., & Stein, J. A. (1996). Self-control in a criminal sample: An examination of construct validity. *Criminology*, *34*, 209-228.

Mathers, M., Toumbourou, J. W., Catalano, R. F., Williams, J., & Patton, G. C. (2006). Consequences of youth tobacco use: A review of prospective behavioural studies. *Addiction*, *101*, 948-958.

Mensch, B. S., & Kandel, D. B. (1988). Dropping out of high school and drug involvement. *Sociology of Education*, *61*, 95-113.

Mitchell, O., & MacKenzie, D. L. (2006). The stability and resiliency of self-control in a sample of incarcerated offenders. *Crime & Delinquency*, *52*, 432-499.

Moore, T. H., Zammit, S., Lingford-Hughes, A., Barnes, T. R., Jones, P. B., Burke, M., & Lewis, G. (2007). Cannabis use and risk of psychotic or affective mental health outcomes: A systematic review. *The Lancet*, *370*, 319-328.

Newcomb, M. D., & Bentler, P. M. (1988). Impact of adolescent drug use and social support on problems of young adults: A longitudinal study. *Journal of Abnormal Psychology*, *97*, 64-75.

Phillips, M. D. (2012). Assessing the impact of drug use and drug selling on violent offending in a panel of delinquent youth. *Journal of Drug Issues*, *42*, 298-316.

Piquero, A. R., MacDonald, J., Dobrin, A., Daigle, L. E., & Cullen, F. T. (2005). Self-control, violent offending, and homicide victimization: Assessing the general theory of crime. *Journal of Quantitative Criminology*, *21*, 55-71.

Polakowski, M. (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, T. C., & Cullen, F. T. (2000). The empirical status of Gottfredson and Hirschi's general theory of crime: A meta-analysis. *Criminology*, *38*, 931-964.

Pratt, T. C., Cullen, F. T., Sellers, C. S., Winfree, L. T., Madensen, T. D., Daigle, L. E., . . . Gau, J. M. (2010). The empirical status of social learning theory: A meta-analysis. *Justice Quarterly*, *27*, 765-802.

Rebellon, C. J., Straus, M. A., & Medeiros, R. (2008). Self-control in global perspective: An empirical assessment of Gottfredson and Hirschi's general theory within and across 32 national settings. *European Journal of Criminology*, *5*, 331-361.

Reinarman, C., & Fagan, J. (1988). Social organization and differential association: A research note from a longitudinal study of violent juvenile offenders. *Crime & Delinquency*, *34*, 307-327.

Sellers, C. S., Cochran, J. K., & Branch, K. A. (2005). Social learning theory and partner violence: A research note. *Deviant Behavior*, *26*, 379-395.

Smart, R. G., & Ogborne, A. C. (2000). Drug use and drinking among students in 36 countries. *Addictive Behaviors*, *25*, 455-460.

Stein, J. A., Newcomb, M. D., & Bentler, P. M. (1987). An 8-year study of multiple influences on drug use and drug use consequences. *Journal of Personality and Social Psychology*, *53*, 1094-1105.

Swahn, M. H., & Bossarte, R. M. (2007). Gender, early alcohol use, and suicide ideation and attempts: Findings from the 2005 youth risk behavior survey. *Journal of Adolescent Health*, *41*, 175-181.

Swendsen, J., Burstein, M., Case, B., Conway, K. P., Dierker, L., He, J., & Merikangas, K. R. (2012). Use and abuse of alcohol and illicit drugs in US adolescents: Results of the National Comorbidity Survey–Adolescent Supplement. *Archives of General Psychiatry*, *69*, 390-398.

Terry-McElrath, Y. M., O'Malley, P. M., & Johnston, L. D. (2009). Reasons for drug use among American youth by consumption level, gender, and race/ethnicity: 1976-2005. *Journal of Drug Issues*, *39*, 677-713.

Turner, M. G., & Piquero, A. R. (2002). The stability of self-control. *Journal of Criminal Justice*, *30*, 457-471.

Unger, J. B., Ritt-Olson, A., Teran, L., Huang, T., Hoffman, B. R., & Palmer, P. (2002). Cultural values and substance use in a multiethnic sample of California adolescents. *Addiction Research & Theory*, *10*, 257-279.

Unnever, J. D., Cullen, F. T., & Pratt, T. C. (2003). Parental management, ADHD, and delinquent involvement: Reassessing Gottfredson and Hirschi's general theory. *Justice Quarterly*, *20*, 471-500.

Vazsonyi, A. T., & Belliston, L. M. (2007). The family → low self-control → deviance: A cross-cultural and cross-national test of self-control theory. *Criminal Justice and Behavior*, *34*, 505-530.

Vazsonyi, A. T., & Crosswhite, J. M. (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, A. T., Pickering, L. E., Junger, M., & Hessing, D. (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, A. T., Wittekind, J. E. C., Belliston, L. M., & Van Loh, T. D. (2004). Extending the general theory of crime to "the East": Low self-control in Japanese late adolescents. *Journal of Quantitative Criminology*, *20*, 189-216.

Weichold, K., Wiesner, M. F., & Silbereisen, R. K. (2014). Childhood predictors and mid-adolescent correlates of developmental trajectories of alcohol use among male and female youth. *Journal of Youth and Adolescence*, *43*, 698-716.

Wills, T. A., & Dishion, T. J. (2004). Temperament and adolescent substance use: A transactional analysis of emerging self-control. *Journal of Clinical Child and Adolescent Psychology*, *33*, 69-81.

Young, S. E., Corley, R. P., Stallings, M. C., Rhee, S. H., Crowley, T. J., & Hewitt, J. K. (2002). Substance use, abuse and dependence in adolescence: Prevalence, symptom profiles and correlates. *Drug and Alcohol Dependence*, *68*, 309-322.