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Alcohol Outlet Density, Parental Monitoring, and Adolescent Deviance: A Multilevel Analysis

Bridget Freisthler, Ph.D.,

Department of Social Welfare, UCLA School of Public Affairs, 3250 Public Policy Building, Box 951656, Los Angeles, CA 90095-1656

Hilary F. Byrnes, Ph.D., and

Prevention Research Center, Pacific Institute for Research and Evaluation, 1995 University Ave., Suite 450, Berkeley, CA 94704

Paul J. Gruenewald

Prevention Research Center, Pacific Institute for Research and Evaluation, 1995 University Ave., Suite 450, Berkeley, CA 94704

Abstract

Lower levels of parental monitoring are associated with youth problem behaviors, including substance use and delinquency. Recent studies employing routine activities theory have hypothesized that greater densities of alcohol outlets, particularly bars, may provide parents more opportunities to socialize outside the home. This, in turn, may decrease a parent's ability to effectively monitor the activities of his or her child, resulting in more deviant behaviors by the adolescent. Using hierarchical linear modeling (HLM), the current study assesses whether or not greater densities of alcohol outlets in zip code areas ($n = 50$) interact with levels of parental monitoring to affect levels of deviance among adolescents aged 14 to 16 ($n = 1,541$). The study finds that adolescents who have higher grade point averages and have not used alcohol report the lowest levels of deviant behaviors. Furthermore, the density of bars interacts with reports of parental monitoring such that adolescents in areas with more bars per roadway mile report lower levels of parental monitoring behaviors, which is associated with higher levels of deviance. These findings suggest that in those areas with greater densities of bars parents may be spending more time away from home, making monitoring of their adolescents more difficult, or parents may be drinking more frequently, thus impairing their ability to adequately monitor their children. Policies and practices that limit the number of bars in neighborhood areas with large populations of adolescents may reduce deviant behaviors.

The relationship between parental monitoring and youth deviance, including substance use and delinquency, has been well established (Sampson & Laub, 1994; Steinberg, 1986; Coley & Hoffman, 1996). Parental monitoring is a parent's knowledge of his or her child's daily activities and movements throughout the day (Dishion & McMahon, 1998). Barnes and Farrell (1992) reported that parental monitoring was the strongest predictor of adolescent problem behaviors (i.e., substance use, deviance, and school misconduct), as compared to other parental control behaviors. Similarly, other researchers (Ary et al., 1999; Parker & Benson, 2004; Reifman, Barnes, Dintcheff, Farrell, & Uhteg, 1998) have found a relationship between monitoring and

Correspondence should be sent to Bridget Freisthler at the above address, e-mail at freisther@spa.ucla.edu or by phone at (310) 206-1602.

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adolescent substance use and other behavior problems. Monitoring has been shown to impact adolescent behavior problems directly, as well as indirectly, through affecting associations with peers who drink (Simons-Morton & Chen, 2005). Further, the relation between monitoring and adolescent problem and delinquent behavior has been documented across ethnic and socioeconomic groups (Ary et al., 1999; Forehand, Miller, Dutra, & Chance, 1997).

Recently, studies have begun to examine those factors within a family's local environment that may make monitoring more or less difficult for parents. These studies have found that the socioeconomic status of a neighborhood may affect the ability of parents to effectively monitor the actions of their children. Sampson, Morenoff, and Earls (1999) suggest that potential social networks and shared norm enforcement are available to residents through higher levels of social capital in more advantaged neighborhoods. For example, neighborhoods with higher levels of concentrated affluence, residential stability, and low population density predicted greater reports of reciprocated exchange and child-centered social control in neighborhoods (Sampson et al., 1999). Through such networks, the potential for collective supervision of neighborhood children in areas with high levels of social capital offers increased assistance for parents in monitoring their children (Beyers, Bates, Pettit, & Dodge, 2003). In neighborhoods with lower levels of social capital, an increased burden is placed on parents, as they need to compensate for the lack of community-level child control with increased monitoring of their own (Beyers et al., 2003; Sampson, et al., 1999). In neighborhoods with multiple problems, expectations of residents around the collective action for children may be decreased as residents are more focused on their own well-being (Rankin & Quane, 2002; Sampson et al., 1999). In addition, the physical and social disorder present in high-risk neighborhoods might make it hard for residents to set and enforce norms of appropriate behavior. Thus by more fully understanding how the neighborhood may affect parental monitoring, alternative means of preventing adolescents from participating in deviant behaviors may be developed.

In a related literature, Alaniz and colleagues (1998) examined how alcohol outlet density were related to rates of neighborhood youth violence. They showed that significant cross-sectional correlations exist between off-premise outlet densities (e.g., liquor stores, convenience stores) and violent assaults among youth, independent of other local sociodemographic characteristics of neighborhoods. These authors suggested that off-premise outlets may send the message that a neighborhood has weak social control over the neighborhood (Alaniz et al., 1998). Other studies of outlets and violence among adults have found a relationship between bars and severe assaults (Lipton & Gruenewald, 2002) and on-premise outlets (e.g., bars and restaurants that serve alcohol) and violent crime (Gorman et al., 2002; Scribner et al., 1995).

These studies have put forth several theories relating outlets to problems. First, outlets may act as "attractors" for individuals who wish to participate in other deviant behaviors, such as drug use or gangs (Alaniz et al., 1998). Thus, according to this theory, adolescents in areas with greater densities of off-premise alcohol outlets should report higher levels of participation in deviant activities. Second, routine activities theory suggests that where and when people conduct their daily life may place them at greater or lesser risk for participating in deviant activities. In essence, routine activities theory hypothesizes that the convergence of a suitable target, motivated offender, and absence of effective guardians result in the participation in criminal behaviors (Cohen & Felson, 1979). With regards to youth deviance, lack of parental monitoring can be equated to absence of guardians so that lower levels of parental monitoring should result in higher levels of deviance. Activities that provide parents with opportunities to socialize away from home without their children (e.g., bars) may adversely affect parenting behaviors, particularly those related to supervision and monitoring of their children. Providing limited support for this theory, Freisthler, Midanik, and Gruenewald (2004) found that density of bars was related to child neglect, but not for physical abuse.

Most studies of alcohol outlet densities have been conducted primarily at the ecological (i.e. neighborhood) level making it difficult to determine the exact relationship between outlets and parenting behaviors. This study begins to bridge individual level behaviors (e.g., adolescent deviance, parental monitoring) with ecological characteristics (e.g., alcohol outlet density) to develop a better understanding of the ways in which the environment can affect parenting behaviors and youth problems.

Purpose

The purpose of this study is to examine how alcohol outlet densities (bars, restaurants that serve alcohol, and off-premise outlets) interact with parental monitoring activities to affect levels of deviance, while controlling for other known correlates of participating in deviant behaviors among adolescents aged 14 to 16. Consistent with alcohol outlets as “attractors” theory, we hypothesize that adolescents living in areas with greater densities of off-premise alcohol outlets will participate in deviant behaviors at greater levels. Per routine activities theory, it is hypothesized that those areas with greater densities of bars will have lower levels of parental monitoring behaviors, and thus, increased levels of deviant behavior among adolescents.

Methods

Data for this study were collected as part of a larger study examining how alcohol availability and youth access to alcohol is related to drinking behaviors. The current study is cross-sectional in design and employed a two-stage geostatistical sampling procedure. In the first stage, zip code areas across the state of California were stratified in a 3×3 table of median household income and alcohol outlets per roadway mile, where the level for each stratification variable represented the highest, middle, and lowest 25% of the distribution of these characteristics. Zip codes that represented the extreme (high-high, low-high, high-low, low-low) and middle categories (medium-medium) of these measures were then examined. From each of these cells, 10 zip codes were randomly selected. The final sample consisted of 10 zip code areas for each of 5 groups ($n_{\text{zip}} = 50$). In the second stage, potential respondents aged 14 to 16 were contacted via telephone to participate in the survey. Identification of potential respondents was aided by the use of a list-assisted sample. The number of respondents per zip code ranged from 7 to 42, with an average of 30.8 respondents per each area ($n_{\text{ind}} = 1,541$). Consent to participate in the survey was obtained from both a parent or guardian and the adolescent. Respondents were given \$20 for participating. The response rate among known eligible respondents as calculated by standards developed by the Council of American Survey Research Organizations (CASRO) was 43.2%. Among the refusals for known eligibles, 30.4% of parents refused the survey, 5.9% of the children refused and 17.5% were passive refusals (the selected respondent was never available on call back).

Individual Level Measures

Deviance—Youth deviance was assessed using a 10-item measure asking the frequency with which respondents had (1) given a false excuse for missing work or class; (2) lied to cover up something you did; (3) purposely damaged other people's property; (4) taken things from a store or shop without paying for them; (5) been in a fight where you hit or shoved someone; (6) skipped work or school without permission; (7) sold illegal drugs; (8) taken money that did not belong to you; (9) threatened someone with a gun, knife or other weapon; and (10) used illegal drugs. Responses for these questions were never, 1-2 times, 3-5 times, 6-10 times, more than 10 times. The average of all ten responses was used as the dependent variable for the current study. Cronbach's alpha assessing the reliability of the scale was .75. The average level of deviance for all respondents was .41, indicating that most adolescents participated in deviant activities relatively infrequently (see Table 1). Due to a skewed distribution of this index, the square root of the deviance measure is used in all multivariate analyses.

Demographics—Individual level variables used in the analysis included sex, race/ethnicity and age of the respondent. Race/ethnicity was recoded as dummy variables for African American, Latino and Other Race and gender was recoded as Male = 1, Female = 0. As shown in Table 2, the sample is relatively evenly split between males and females, and among all three age groups. About six percent of the respondents were African American.

Grade Point Average (GPA)—Respondents were not asked their grade point average directly; rather they were asked to tell the interviewer the number of classes in which they received As, Bs, Cs, Ds, and Fs in the past school year. For those respondents who reported taking between five and eight classes, grade point average was computed, where an A = 4.0, B = 3.0; C = 2.0; D = 1.0, and F = 0.0. The average GPA was 3.13. Those respondents who reported grades for fewer than five classes or more than eight classes were recoded having missing GPA.

Social Control—To assess levels of child-centered social control, respondents were instructed to think about the actions of people in their neighborhood, which was defined as the block or street on which they live and several blocks or streets in each direction. Three items with responses of very unlikely, unlikely, neither likely nor unlikely, likely, or very likely were used to create an average level of social control for each respondent. These items asked respondents to assess how likely neighbors would do something: (1) if a group of neighborhood children were skipping school and hanging out on a street corner; (2) if some children were spray-painting graffiti on a local building; and (3) if a child was showing disrespect to an adult. Cronbach's alpha was .62.

Drinking Status—Drinking status was determined by assessing whether or not the respondent had an alcoholic drink within the past year. Those who did not drink were recoded as 1 (abstainers), and those who did drink were recoded as 0. About two-thirds of the respondents were abstainers.

Parental Monitoring—Levels of parental monitoring were assessed using the average responses from four separate items. These items asked how often parents (1) knew where you were going when you went out at night; (2) knew who you were going with when you went out at night; (3) told you that you had to be home at a specific time when you went out at night; and (4) waited up for you when you went out at night. Respondents answered with most of the time, some of the time, rarely, and never. Cronbach's alpha was .54.

Number of Guardians—As an additional measure of “effective guardians” per routine activities theory, we include a measure for the number of guardians reported by respondents. Specifically, respondents were asked whether or not they had a female or male guardian. A female guardian was defined as “the woman who has the major responsibility for raising you--like your mother, a stepmother, a grandmother, an aunt, or maybe someone else.” A male guardian was defined as “the man who has the major responsibility for raising you--like your father, a stepfather, a grandfather, an uncle, or maybe someone else.” Respondents answered yes, no, or refused. For this study, respondents reporting both a male and female guardian were recoded as 1 while those only reporting a male or female guardian (9.6%) or no guardian (.1%) were recoded as 0.

Zip Code (Neighborhood) Level Measures

Median Household Income—Median household income was obtained by 2003 *Sourcebook America* (CACI Marketing Systems, 2003) annual estimates for each zip code area. The average median household income per zip code was about \$56,000. This measure was rescaled by dividing by 1,000 for analyses.

Alcohol Outlet Density—Alcohol access was measured by the number of bars, restaurants that serve alcohol, and off-premise alcohol outlets per roadway mile. Measures of alcohol access were obtained from the California Department of Alcohol Beverage Control. Off-premise outlets require the purchaser to consume the alcohol away from the establishment and include liquor, grocery and stores. An establishment was coded as an off-premise outlet if the license type was 20 (Off-Sale Beer & Wine) or 21 (Off-Sale General). Establishments with license types of 23 (Small Beer Manufacturing), 40 (On-sale beer), 42 (Beer/Wine Public Premise), 48 (General Public Premise), 61 (Beer public premises) and 75 (General Brew-Pub) were coded as bars, and those with license types 41 (Beer/Wine Eating Place) or 47 (General Eating Place) were coded as restaurants. Only establishments with active licenses at the beginning of January 2003 were used in this study. Ninety-nine percent of outlets were successfully geocoded.

Statistical Analysis

Since respondents were nested within neighborhoods, hierarchical linear models (HLM Version 5.0; Byrk & Raudenbush, 1992; Raudenbush, Bryk, Cheong, & Congdon, 2000) were used to estimate a two-level model with 1,541 survey respondents at Level-1 and 50 neighborhood areas at Level-2.

Level-1:

$$\mathbf{y} = \mathbf{a} + \mathbf{X}\mathbf{b} + \mathbf{e} \quad (1)$$

where $\mathbf{y}$ is the square root of respondent's reports of youth deviance. $\mathbf{a}$ is a vector of unit effects. $\mathbf{X}$ refers to a matrix of individual characteristics and $\mathbf{b}$ is a vector of the coefficients for those characteristics. The error term for the Level 1 model is $\mathbf{e}$. Level-1 variables were group mean centered.

Level-2:

$$\mathbf{a} = \alpha_0 + \mathbf{W}\boldsymbol{\beta} + \varepsilon_0 \quad (2)$$

$$\mathbf{b}_{pm} = \alpha_1 + \mathbf{W}\boldsymbol{\beta} + \varepsilon_1 \quad (3)$$

where $\mathbf{W}$ is a matrix of neighborhood characteristics. $\boldsymbol{\beta}$ is a vector of coefficients for the outlet and neighborhood characteristics. α is the Level 2 intercept and ε is the Level 2 error term associated with that intercept. $\mathbf{b}_{pm}$ is the beta coefficient for the Level 1 variable on parental monitoring. The Level 1 coefficients are predicted by the Level 2 variables. Level-2 variables were not centered.

The reduced form model was:

$$\mathbf{y} = (\alpha_0 + \alpha_1) + \mathbf{X}\mathbf{b} + \mathbf{X}\mathbf{b}_{pm}(\mathbf{W}\boldsymbol{\beta}) + \mathbf{W}\boldsymbol{\beta} + (\mathbf{e} + \varepsilon_0 + \varepsilon_1) \quad (4)$$

Equation (4) shows that both main effects ($\mathbf{Xb}$) of the Level 1 variables and interactions with of parental monitoring and the Level 2 variables ($\mathbf{X b_{pm}(W\beta)}$) are included in the model. The model also takes into account main effects of the Level 2 variables ($\mathbf{W\beta}$). The results reported in this paper use final estimation with robust standard errors.

Missing Data

While most variables used in the analysis had negligible or no missing data, both GPA and the parental monitoring index had more substantial amounts of data, 14.6% and 7% respectively. For this reason, a procedure to test and correct for possible biasing effects of sample selection was conducted (Heckman, 1979). A probit model was used to assess correlates of the pattern of missingness with demographic variables.¹ The results of this probit found no differences in those who had missing data and those who did not in terms of gender, age, child-centered social control, race, and number of guardians. An Inverse Mill's ratio (IMR) was constructed from these results and used as a covariate in the subsequent multi-level models of deviance, an exogenous covariate that reflects selectivity effects (Heckman, 1979). This covariate was not statistically significant in the final analysis indicating that selection bias was not a problem. As such we report the analysis without the control for missingness. Cases with missing data were excluded from the multivariate analysis.

Results

This study examined whether or not density of bars moderated levels of parental monitoring, thus affecting adolescent deviance. The results of the multilevel model are shown in Table 3. In Model 1, only the main effects for both the individual and neighborhood characteristics are shown (see Equations 1 and 2 above.) In this model, Level 2 (zip code) characteristics are directly related to the Level 1 intercept. In Model 2, the moderating effects of zip code characteristics on parental monitoring are added. Model fit statistics comparing the deviance from the restricted and full models show that the full model is a better fit of the data ($\chi^2 = 21.69$, $df = 6$, $p = .002$)

In Model 1, grade point average, abstaining from alcohol use, and parental monitoring were negatively related to levels of deviance. There were no significant main effects of neighborhood level variables. In Model 2, many of the individual main effects remain: respondents with higher grade point averages, who have abstained from alcohol use with higher levels of parental monitoring report lower levels of deviance. Again, no Level 2 main effects were statistically significant. The main effect of parental monitoring was no longer statistically significant, but in zip code areas with greater densities of bars, parental monitoring was decreased. This indicates that adolescents living in zip code areas with the highest number of bars per roadway mile report the lowest levels of parental monitoring. This interaction was related to higher levels of reported deviant behaviors among 14 to 16 year olds in the study.

Discussion

The results of this study indicate that both individual and zip code level characteristics were related to self-reported deviant behavior among adolescents aged 14 to 16. We did not find support for our hypothesis that density of off-premise outlets will be related to self-reported levels of youth deviance (a main effect) and but did find support that bar density will interact with parental monitoring such that areas with greater densities of bars have lower levels of parental monitoring and thus higher levels of deviance by adolescents. Specifically, this study finds that the density of bars per roadway mile moderates the relationship between parental

¹There was no missing data among Level 2 variables. These independent variables were not used in the probit model to assess missingness.

monitoring and deviance, such that those areas with higher density of bars have lower levels of parental monitoring and higher levels of deviant behaviors among youth. However, off-premise outlet density was not associated with levels of deviance.

Interpreting these results within the framework of routine activities theory, the greater density of bars in a zip code area may prevent parents or other adults from being available as “suitable guardians” for their children’s behaviors. For example, parents may be spending more time at the bars (potentially drinking more often) thus reducing their ability to appropriately monitor their adolescent’s activities. With less parental monitoring, adolescents may have more opportunities to participate in deviant behaviors. Surprisingly, the presence of both a male and female guardian was not related to lower levels of deviance. This may be a result of how the question was worded. As asked, while the adolescent may have both a male and female guardian, both guardians may not be living in the same home as the adolescent as is likely to be the case for divorced parents. Thus while the majority of adolescents (about 90%) report having both a male and female guardian, for many adolescents they may have a primary caregiver with whom they live who has the sole responsibility of monitoring behavior. Further complicating the picture, adolescents may be living with more than one guardian of the same sex (e.g., mother and grandmother). To better ascertain the number of effective guardians available to regularly monitor the adolescent’s behavior, future research should ask the number of guardians living *in the home*.

For the subset of adolescents studied here (ages 14 to 16), it appears that density of off-premise alcohol outlets is not likely to affect behaviors of those prone to participating in deviant activities. As such, off-premise outlets are not acting as “attractors” for this population. This is not consistent with previous research that found a positive relationship between adolescents and young adults (ages 15 to 24) and violence (Alaniz et al., 1998). This discrepancy may be due to the truncated age range used in the current study compared to previous research and the type of deviant behaviors studied. The current study assesses levels of both minor and severe deviance combined while the previous study used violence, a more severe type of deviant behavior. It may be that adolescents prone to participate in deviant activities in their early teens begin to seek out places that afford them the opportunity to participate in other, more serious deviant activities as they grow older. Following the trajectory of behavior in deviant activities and the effect of off-premise alcohol outlet density over time will help clarify this relationship.

In Model 1 the current research found a relationship between child-centered social control and deviance which is consistent with previous research (Elliott, et al. 1996; Molnar, Miller, Azrael, & Buka, 2004). Unlike previous research, the current study did not find a relationship between median household income and parental monitoring (Sampson & Laub, 1994; Shek, 2005). Consistent with previous research, higher GPA and increased parental monitoring are associated with lower levels of deviance (Barnes & Farrell, 1992; Kasen, Cohen, & Brook, 1998), although it appears the latter is moderated by bar density in the neighborhoods.

The results found here should be interpreted cautiously. While routine activities theory provides one explanation for the current findings, it does not rule out the fact that a third factor may explain these results. For example, those areas with higher densities of bars are often found to have higher levels of assaults and other types of violent crime (Gorman et al., 2001; Lipton & Gruenewald, 2002; Scribner et al., 1995). Higher neighborhood levels of overall crime may be related to levels of deviant behavior among adolescents and may make it more difficult for parents to monitor the behavior of those adolescents. Future research needs to incorporate neighborhood levels of crime to provide a more definitive statement on the relationship between outlets, parental monitoring and youth deviance.

Additionally, as this study is cross-sectional in design, causality cannot be determined. By studying the longitudinal relationships, researchers will have a better idea of the causal pathways leading to deviance and the role alcohol outlets and deviance in that relationship. This study uses reports by the adolescent on deviant behaviors and parental monitoring which are subject to social desirability bias. Future studies that triangulate these responses with official reports of deviance from other sources such as police reports and levels of monitoring as assessed by parents will likely avoid this problem. Finally, both the parental monitoring and child-centered social control scales have low reliability. The parental monitoring scale includes 3 questions on knowledge of child whereabouts and 1 on rule-setting. These could be different concepts, as knowledge of whereabouts has been related to better outcomes, but rule-setting has not. These relationships must be assessed using better measures of these concepts in order to truly understand the relationship between alcohol outlets, parental monitoring and adolescent deviance.

Despite these limitations, this study finds that participation in deviant behaviors may be a result of the interaction between the environment and the family. Interventions designed to reduce adolescent deviance must consider the family in context to better understand how modifications in the environment may assist parents in providing a better situation for their children. Specifically, it appears that reducing the density of bars may serve two functions: (1) enhancing a parent's ability to monitor the behaviors of his or her adolescent, and (2) reducing overall deviance and crime. Thus, environmental strategies such as reducing bar density in neighborhoods with higher numbers of adolescents or limiting the hours in which bars are open for business may reduce youth deviance in that area. Furthermore, if this finding is a result of "time spent away from home" for parents, as opposed to parental drinking, then prevention strategies might include developing neighborhood-based centers that provide outside supervision of age appropriate activities for youth, but also serve as information and resource centers for parents to gather and develop supportive networks.

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Table 1

Descriptive Statistics for Individual and Neighborhood Characteristics

Variable Name	Mean	Standard Deviation	Minimum	Maximum
Individual Level				
Youth Deviance (n = 1,540)	.41	.43	0.0	3.1
Social Control (n = 1,537)	3.63	1.01	1.0	5.0
Parental Monitoring (n = 1,433)	3.58	.50	1.0	4.0
GPA (n = 1,316)	3.21	.68	0.0	4.0
Neighborhood Level				
Median Household Income (n = 50)	55539	24208	23561	102096
Bars/Roadway Mile (n = 50)	.05	.09	0.0	.54
Restaurants/Roadway Mile (n = 50)	.27	.40	0.0	2.3
Off Premise/Roadway Mile (n = 50)	.26	.27	0.0	1.4

Table 2

Demographic Characteristics of Phone Survey Respondents

Variable Name	%	(sample n)
Sex		
Male	51.5	(794)
Female	48.5	(747)
Age		
14	34.3	(528)
15	33.4	(514)
16	32.4	(499)
Race/Ethnicity		
African American, non Latino	6.2	(94)
Caucasian, non Latino	44.3	(682)
Latino	35.6	(548)
Other	13.2	(204)
Drinking Status		
Abstainer	66.5	(1,024)
Drinker	33.5	(517)
Number of Guardians		
0 or 1	9.7	(149)
2	90.3	(1,392)

Table 3

Hierarchical Linear Model Analysis of Square Root of Youth Deviance

Respondent Characteristics (Level 1)	Neighborhood Characteristics (Level 2)	Model 1			Model 2		
		b	se	p	b	se	p
Intercept		.579	.040	< .001	.577	.041	< .001
	Median Household Income ($\times 1000$)	-.001	.001		-.001	.001	
	Bars/roadway mile	.055	.188		-.017	.190	
	Restaurants/roadway mile	.028	.046		.028	.047	
	Off premise/roadway mile	-.012	.062		-.001	.067	
Age		-.009	.011		-.009	.011	
GPA		-.107	.017	< .001	-.105	.017	< .001
Social Control		-.020	.008	.012	-.020	.008	.015
Parental Monitoring		-.115	.019	< .001	-.114	.055	.044
	Median Household Income ($\times 1000$)				-.001	.001	
	Bars/roadway mile				.619	.230	.010
	Restaurants/roadway mile				.026	.058	
	Off premise/roadway mile				-.082	.060	
Male		.030	.017		.030	.017	
African American		.054	.049		.054	.049	
Latino		-.011	.030		-.011	.030	
Other Race		.031	.023		.032	.024	
Abstainer		-.174	.021	< .001	-.175	.021	< .001
Two Guardians		-.053	.034		-.050	.034	
Deviance Statistic			536.684			551.698	