Psychology of Addictive Behaviors
2003, Vol. 17, No. 1, 24–31

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0893-164X/03/$12.00 DOI: 10.1037/0893-164X.17.1.24

# Buffering Effect of Religiosity for Adolescent Substance Use

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This research examined the hypothesis that religiosity buffers the impact of life stress on adolescent substance use. Data were from a sample of 1,182 participants surveyed on 4 occasions between 7th grade (mean age = 12.4 years) and 10th grade. Religiosity was indexed by Jessor's Value on Religion Scale (R. Jessor & S. L. Jessor, 1977). Zero-order correlations showed religiosity inversely related to alcohol, tobacco, and marijuana use. Significant Life Events × Religiosity buffer interactions were found in cross-sectional analyses for tobacco, alcohol, and marijuana use. A latent growth analysis showed that religiosity reduced the impact of life stress on initial level of substance use and on rate of growth in substance use over time. Implications for further research on religiosity and substance use are discussed.

Recent investigations have indicated that religiosity is a protective factor with regard to health status. Epidemiologic studies have indicated that religiosity is inversely related to adult mortality rates, and lower rates of substance use among individuals with an involvement in religion have been suggested as contributing to this mortality differential (Levin, 1996; McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000). A relation of religious involvement to lower rates of alcohol use and problem behavior among adolescents has also been observed in several areas of the United States (e.g., Bahr, Maughan, Marcos, & Li, 1998; Brody, Stoneman, & Flor, 1996), but at present there is limited understanding of the nature of the relation between religiosity and substance use as it occurs during adolescence.

The present research was focused on buffering effects. Studies of adolescents have shown several examples of factors that reduce the impact of adverse experiences, that is, buffering effects (Wills, Blechman, & McNamara, 1996). For example, measures of family support and of problem-solving skills have been shown to reduce the effect of life stress on outcomes such as adjustment and academic achievement (Dubow & Tisak, 1989; Wolchik, Ruehlman, Braver, & Sandler, 1989), and parental support has been shown to reduce the impact of negative life events on adolescent substance use (Wills, Vaccaro, & McNamara, 1992). There is some evidence for religiosity as a protective factor, indicated by studies showing that measures of religiosity are inversely correlated with indices of adolescent substance use (Wallace & Williams, 1997), and considerable evidence indicating that life stress is a risk factor for adolescent alcohol and other drug use (e.g., Chassin, Pillow, Curran, Molina, & Barrera, 1993; Wills, 1990). Given the existence of buffering processes it is thus plausible to predict that religiosity has a buffering effect for adolescent stressors, reducing the impact of life events on alcohol and other substance use. In the following sections we outline the background of the research and the basis for the hypothesis.

## Religiosity and Adolescent Substance Use

Studies of adolescent substance use have used various definitions of *religiosity* (Wallace & Williams, 1997). Categorical indices of religious affiliation (vs. none) have shown inconsistent results (e.g., Amey, Albrecht, & Miller, 1996), but consistent inverse relations with alcohol and other substance use have been found for measures that tap frequency of attendance at religious services (Adlaf & Smart, 1985; Amey et al., 1996; Hadaway, Elifson, & Petersen, 1984). Effects for religiosity have been found in later adolescence as well as among younger persons (Foshee & Hollinger, 1996).

Studies that index the perceived importance of religion have consistently shown inverse relations with substance use. Jessor and colleagues (Jessor, Chase, & Donovan, 1980; Jessor & Jessor, 1977) have found that a scale on the perceived importance of religion was inversely related to measures of problem drinking in regional and national samples of high school students. Inverse relations of similar measures to frequency of tobacco, alcohol, and marijuana use have also been found in other samples (Bahr et al., 1998; Barnes, Farrell, & Banerjee, 1994; Resnick et al., 1997). Although the attributes of the studies varied, results have generally

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This research was supported by a Research Scientist Development Award (K02 DA00252) from the National Institute on Drug Abuse and by Grant R01 DA05950 from the National Institute on Drug Abuse. We thank the superintendents of the school districts for their support; the parents and participating students for their cooperation; and Sean Cleary, Elizabeth Hirky, Grace McNamara, and Donato Vaccaro for assistance with the research.

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been significant with control for demographic characteristics such as ethnicity and parental socioeconomic status.

## Buffering Effects in Adult Samples

Several studies of adult samples, with psychological distress as the outcome, have investigated whether there is evidence for buffering effects of religiosity. Williams, Larson, Buckler, Heckman, and Pyle (1991) investigated this question with longitudinal data from a community sample of 720 adults. Multiple regression analyses showed a significant interaction between life stress and religiosity: The positive relation between stress and anxiety/depression symptomatology was reduced among persons with a higher frequency of religious attendance, that is, a buffering effect. This effect was found both for a measure of general life stressors and a measure of physical health problems. Buffering effects were found for religious attendance but not for a dichotomous index of religious affiliation.

Other studies with adults have provided evidence for buffering effects with various indices of symptomatology. A study conducted by Kendler, Gardner, and Prescott (1997) with a community sample found that the impact of life stress on adults' depression was buffered by a measure of the importance of religion, and buffering effects have been found in other studies with interactions involving gender (Siegel & Kuykendall, 1990) or denomination (Park, Cohen, & Herb, 1990). A study of older adults conducted by Strawbridge, Shema, Cohen, Roberts, and Kaplan (1998) found buffer interactions for a measure of organizational religiosity with respect to nonfamily stressors (e.g., financial problems) but not with respect to measures of family stressors (e.g., marital problems, physical abuse). Finally, a prospective study of older adults (Krause, 1997) found buffering effects with mortality as the outcome: The effect of life stress on mortality was reduced among people with higher scores on religious coping. In this study, the buffering effect was found primarily among participants with lower levels of education.

## The Present Research

Evidence from studies with adults suggests that religiosity may operate as a buffering factor, reducing the impact of life stress on adverse outcomes. Because buffering processes have been found among children and adolescents (Wills, Blechman, & McNamara, 1996), we hypothesized that religiosity would have a buffering effect for the relation between life stress and adolescent substance use. We investigated this prediction in a representative sample of adolescents studied over the period from 12 to 16 years of age.

In this research, religiosity was indexed with a measure on the perceived importance of religion, a construct that prior research has indicated to have consistent relations with adolescent substance use. We tested the relation of religiosity with measures of overall alcohol use and heavy drinking, as well as with measures of tobacco and marijuana use, and considered whether the relation was found in various demographic subgroups. We initially tested the hypothesized buffering effect in cross-sectional analyses with multiple regression and then examined moderation effects in a longitudinal analysis based on latent growth modeling of four-wave data on substance use.

# Method

### *Participants*

The data were derived from a school-based longitudinal study in which a sample of adolescents was surveyed on four occasions from 7th grade through 10th grade. The participants were students in public school districts in the New York metropolitan area. The school districts are in mixed urban–suburban communities that are indicated by census statistics as socioeconomically representative of the New York State population (U.S. Department of Commerce, 1993). The initial survey administration was done in 7th grade ($M$ age = 12.4 years, $SD$ = 0.7), when students were in six junior high schools, and continued at yearly intervals through the 9th grade and 10th grade, when students were in four high schools. The baseline sample was 29% African American, 23% Hispanic, 3% Asian American, 37% Caucasian, 5% other ethnicity, and 3% mixed ethnicity, and was 47% female and 53% male. Data on family structure indicated that 53% of the participants were living with both biological parents, 34% were in a single-parent structure, and 13% were in a blended family (one biological parent and one stepparent). Data on parental education indicated that the mode was high school graduate and the mean on a 1-to-6 scale was 3.7 ($SD$ = 1.4), a level just above high school graduate.

### *Procedure*

A self-report questionnaire was administered to students in classrooms by trained research project staff using a standardized protocol. One class period (approximately 40 min) was allotted for questionnaire administration. The survey was administered under confidential conditions, and the responses were protected by a Certificate of Confidentiality from the U.S. Public Health Service. Questionnaires were identified only with a code number. Students were instructed not to write their name on the questionnaire and were assured that their answers were strictly confidential and would not be known to their parents or teachers. Methodological research has shown that when participants are assured of confidentiality, self-reports of substance use have good validity (Murray & Perry, 1987).

Students participated under a consent procedure in which parents were sent, by direct mail, a notice that informed them about the purpose of the research and the nature of the measures. A parent could have his or her child excluded from the research, if he or she wished, by contacting the investigator or a designated administrator at the school. Students also were informed about the purpose and nature of the research at the time of questionnaire administration and were told that they could refuse or discontinue participation.

The completion rates (number of usable questionnaires ÷ total class enrollment from school lists) were 92%, 88%, 85%, and 83% for 7th grade through 10th grade, respectively. Case loss from parent and student refusal was approximately 1% in each wave; the majority of case loss occurred because of student absenteeism. At the questionnaire administration in 8th grade, 9th grade, and 10th grade, students new to the schools were included in the surveys. The size of the sample was 1,702 cases in 7th grade, 1,827 cases in 8th grade, 1,895 cases in 9th grade, and 1,699 cases in 10th grade. For longitudinal data collection, the retention rate for the study variables was approximately 70%.

### *Measures*

The questionnaire began with demographic items. The participant was asked about his or her age, gender, and ethnicity (five options, multiple responding allowed). An item on family structure asked the participant what adult(s) he or she was currently living with (eight options, multiple responding allowed); this was recoded for analysis to three levels (single parent, blended family, or intact family). Items about parental education had the anchor points *grade school* and *post-college* (master's or doctoral degree or other professional education).

*Religiosity.* Religiosity was indexed with Jessor's Value on Religion Scale (Jessor & Jessor, 1977). A lead-in instruction stated, "Here are some questions on what you think about things. Read each one, and circle a number to show what you think." Responses were made on scales that ranged from 1 to 4, with response points "not at all important," "a little important," "pretty important," and "very important." Internal consistency reliability (Cronbach's alpha) was .78–.81 over assessments. The items were "To believe in God," "To be able to rely on religious teachings when you have a problem," "To be able to turn to prayer when you're facing a personal problem," and "To rely on your religious beliefs as a guide for day-to-day living."

*Negative life events.* A 20-item inventory based on previous measures of adolescent stressors (Newcomb & Harlow, 1986; Wills et al., 1992) was administered with a dichotomous (no–yes) response scale to describe events that occurred during the previous year. A subscale of 11 family events, those that could have occurred to a family member and did not directly involve the respondent (e.g., "Father/mother was unemployed") had alphas of .58–.62. A 9-item scale of adolescent events, those that could occur directly to the respondent (e.g., "I had a serious illness") had alphas of .54–.61.[1]

*Adolescent alcohol and other substance use.* Substance use by the participant was measured with items that asked about the typical frequency of his or her alcohol, tobacco, and marijuana use. Three items were introduced to participants with the stem: "How often do you smoke cigarettes/drink alcohol/smoke marijuana?" Responses were made on scales that ranged from 0 to 5, with scale points "never used," "tried once–twice," "used four–five times," "usually use a few times a month," "usually use a few times a week," and "usually use every day." An item on heavy drinking asked the participant whether in the past month he or she had had three or more drinks on one occasion; response points were "no," "happened once," "happened twice," and "happened more than twice." The indices of cigarette, alcohol, and marijuana use were intercorrelated, consistent with prior methodological research (e.g., Needle, Su, & Lavee, 1989). Alpha for a 4-item composite score was .60–.80 over assessments.

## Results

Prevalence data indicated that regular substance use had fairly low levels at 7th grade and a steady increase over the study period. For example, the proportions of participants who smoked weekly or more often were 2%, 6%, 12%, and 16% for 7th through 10th grade, respectively, and the proportions of participants who had engaged in heavy drinking more than once in the past month were 3%, 5%, 10%, and 15% for 7th through 10th grade, respectively. A similar pattern, with initially low level and a steady increase over time, was found for the indices of overall alcohol use and marijuana use. These rates are generally comparable to data from other studies (Johnston, O'Malley, & Bachman, 1995).

Descriptive statistics for the religiosity measure indicated that it had negative skewness, as the majority of the sample reported placing a moderate value on religion. For 7th grade, the scale (with a possible range of 4–16) had $M = 12.21$ ($SD = 3.18$) for 8th grade, $M = 11.97$ ($SD = 3.20$) for 9th grade, $M = 11.92$ ($SD = 3.29$), and $M = 11.72$ ($SD = 3.57$) for 10th grade. Skewness values were −0.60, −0.57, −0.52, and −0.51 for 7th through 10th grade, respectively. These values are consistent with data for similar measures from other studies (Jessor et al., 1980; Jessor & Jessor, 1977).

Relations of demographic characteristics to study variables were examined in analyses of variance. We focus on results that were consistent over assessments. For religiosity, significant effects were found for gender, with girls scoring higher ($p < .001$), and for ethnicity, with African Americans and Hispanics both scoring higher compared with Caucasians ($p < .0001$). An effect of ethnicity indicated that both African Americans and Hispanics experienced more life events compared with Caucasians ($p < .0001$), and families with lower levels of education experienced more life events compared with families with more education ($p < .001$). Participants from single-parent and blended families experienced more adolescent-related events ($p < .0001$). For substance use, the most consistent effects were for ethnicity, with Caucasians showing the highest rates of alcohol and other substance use, Hispanics showing intermediate rates, and African Americans showing the lowest rates. Participants from both single-parent and blended families had somewhat higher rates of substance use compared with participants from intact families. Gender effects were not totally consistent but tended to show girls with higher rates of smoking and boys with higher rates of marijuana use.

Zero-order correlations of religiosity with the substance use indices and the composite score are presented in Table 1. A significant inverse correlation with overall alcohol use was found at the initial assessment and at all subsequent assessment points. Relations of religiosity with the other indices were significant for tobacco and marijuana use from 8th grade onward and for heavy drinking from 9th grade onward. These results are consistent with previous research on religiosity in adolescence (Bahr et al., 1998; Wallace & Williams, 1997). The results also suggest that the effect of religiosity on substance use becomes more generalized over the period from early through middle adolescence.

### *Test for Buffering Effects*

We had hypothesized that religiosity would have a buffering effect for adolescent substance use with respect to negative life events. We initially tested this in multiple regression analyses with substance use as the criterion, including terms for religiosity and life events and the interaction of Life Events × Religiosity. Because of the demographic effects, the regression models included binary indices for gender, ethnicity (African American vs. Hispanic or Caucasian and Hispanic vs. African American or Caucasian), and family structure (single vs. blended or intact and blended vs. single or intact).[2]

Following the procedure outlined by Aiken and West (1991), we first standardized the predictor variables and formed the cross-product by multiplying the standardized terms, and the criterion variable was also standardized. The two (standardized) main-effect terms and the cross-product term were then entered together in multiple regression, with substance use score as the criterion, and unstandardized regression coefficients from this analysis are reported (Aiken & West, 1991, pp. 40–44). We performed analyses for each of the four assessments to test for replicability of effects. To minimize the number of statistical tests, we based the primary analysis on the composite substance use score, but we also performed analyses for each of the substance use indices. Because Strawbridge et al. (1998) suggested that buffering interactions

[1] The study included other measures, such as parental support and adolescent coping (see Wills, McNamara, Vaccaro, & Hirky, 1996), which are beyond the scope of the present article.

[2] Parental education was inversely related to smoking but was not consistently related to value on religion or to other substance use indices, so it was not included in the analyses. Results from analyses including parental education were quite similar to those reported here.

might be found only for family-related life events, we performed subsidiary analyses separately for family events and adolescent events.

Results are presented in Table 2. Religiosity had an inverse relation to the composite substance use score at each assessment point, and life events had a positive relation to the substance use score at each point. Life Events × Religiosity interactions, consistent in form with buffering effects, were observed for the composite substance use score at 7th grade, 8th grade, and 9th grade. At the 10th-grade assessment, significant buffer interactions were found for heavy drinking and marijuana use, but the interaction for the composite substance use score was nonsignificant.[3] For the individual substance use indices, buffering effects were found for heavy drinking, cigarette smoking, and marijuana use but not for the index of overall alcohol use, possibly because this taps a more normative aspect of drinking. Effects for demographic variables were found consistently only for the ethnicity indices, which indicated that African Americans and Hispanics had lower levels of substance use, relative to Caucasians. Over assessments, the regression models accounted for 12%–15% of the variance in the substance use score.

We graphed the interactions using the method of J. Cohen and Cohen (1983), with estimated values of substance use plotted for cases at $M \pm 1$ *SD* on the predictor variables. Graphs for the composite substance use score are portrayed in Figure 1 for 7th grade through 9th grade, respectively. The form of the interactions was a buffering process: The effect of life events on substance use was reduced among participants with higher religiosity.

We addressed demographic differences by analyzing the interaction of a demographic characteristic with religiosity predicting the composite substance use score (e.g., Gender × Religiosity). We then repeated these analyses across the four assessments. We did not see consistent evidence that either the main effect or the buffering effect of religiosity was observable in one demographic group but not in others. Although a difference could sometimes be observed at one assessment, often it was not replicated at other assessments. The most consistent difference was a larger main effect and buffering effect for girls compared with boys, but this difference was found only at 9th and 10th grade and not at earlier assessments.

## *Longitudinal Analysis of Buffer Effects*

The buffering effect of religiosity was tested in a longitudinal context using latent growth modeling. Observations of substance use at 7th grade, 8th grade, 9th grade, and 10th grade were specified as a growth model with constructs for intercept, the initial level of substance use, and slope, the rate of change in substance use over time (Windle, 1997). The intercept construct was specified by setting the loadings of the four observed values of substance use on the intercept to 1, and the slope construct was specified by setting the loadings of the four observed values of substance use on the slope to 0, 1, 2, and 3, representing the assumption of linear growth with equal spacing of assessments over time. Exogenous variables were life events at Grade 7 together with five demographic indices (for gender, ethnicity, and family structure). Covariances among the exogenous variables, and a covariance of the intercept and slope constructs, were also specified.

Path effects were specified through regressing the intercept and slope constructs on the exogenous variables. Analyses were performed in Mplus Version 2.2 using the maximum likelihood method with the Expectation Maximization algorithm for missing data (Muthén & Muthén, 1998). The model for the total sample had reasonable fit to the data, $\chi^2(23, N = 1{,}182) = 49.14$, and root-mean-square error of approximation (RMSEA) less than .050 (RMSEA = .031, confidence interval: .019–.043).[4] Significant paths for life stress indicated that negative life events were related both to higher initial level of substance use ($\beta = .34$), $t(1180) =$

Table 1
*Correlation of Religiosity Measure With Substance Use Indices for Four Assessments*

| | Grade | | | |
|---|---|---|---|---|
| Index | 7th | 8th | 9th | 10th |
| Composite score | −.07** | −.11**** | −.10**** | −.13**** |
| Alcohol use | −.13**** | −.14**** | −.10**** | −.15**** |
| Cigarette smoking | −.02 | −.06** | −.07** | −.07** |
| Marijuana use | −.01 | −.09**** | −.09**** | −.10**** |
| Heavy drinking | −.01 | −.01 | −.05* | −.11**** |

*Note.* *N* for correlations is 1,700–1,800 cases.
* $p < .05$. ** $p < .01$. **** $p < .0001$.

Table 2
*Coefficients From Multiple Regression Analysis for Religiosity and Life Events, With Substance Use as the Criterion, for Four Grade Levels*

| | Grade | | | |
|---|---|---|---|---|
| Variable | 7th | 8th | 9th | 10th |
| Religiosity | −.07** | −.09*** | −.09*** | −.08*** |
| Life events | .33**** | .32**** | .36**** | .32**** |
| Events × Religiosity | $-.05^{*C,H}$ | $-.07^{**C,H}$ | $-.05^{*C,M}$ | $-.04^{H,M}$ |
| $R^2$ | .12 | .13 | .15 | .15 |

*Note.* Values are coefficients from a regression model with composite substance use score as the criterion, including terms for gender, ethnicity, and family structure (not shown in table). *N* for analysis is 1,440–1,580 cases. Superscript letters indicate that a significant interaction was observed for an individual substance use index; C = cigarette smoking, H = heavy drinking, M = marijuana use.
* $p < .05$. ** $p < .01$. *** $p < .001$. **** $p < .0001$.

[3] Measures for family and adolescent events were correlated between .4 and .5, so subsidiary analyses used regression models with religiosity, one main-effect term for events, and the cross-product (e.g., Family Events × Religiosity). For family events, significant interactions ($p < .05$) were found at three time points. For adolescent events, significant interactions ($p < .05$) were found at 7th grade and 8th grade; the interaction term was nonsignificant at the two other time points. Thus the overall interaction was not attributable to just one type of event, and there was evidence for buffering of family events.

[4] We performed analyses for participants with at least three values of substance use and a 7th-grade value for religiosity, an analytic sample of 1,182 cases. No buffering effects were found for overall alcohol use, so the substance use measure for the growth analyses was based on the sum of the scores for heavy drinking, cigarette smoking, and marijuana use at a given time point. Slope loadings for the 9th and 10th grades were freely estimated.

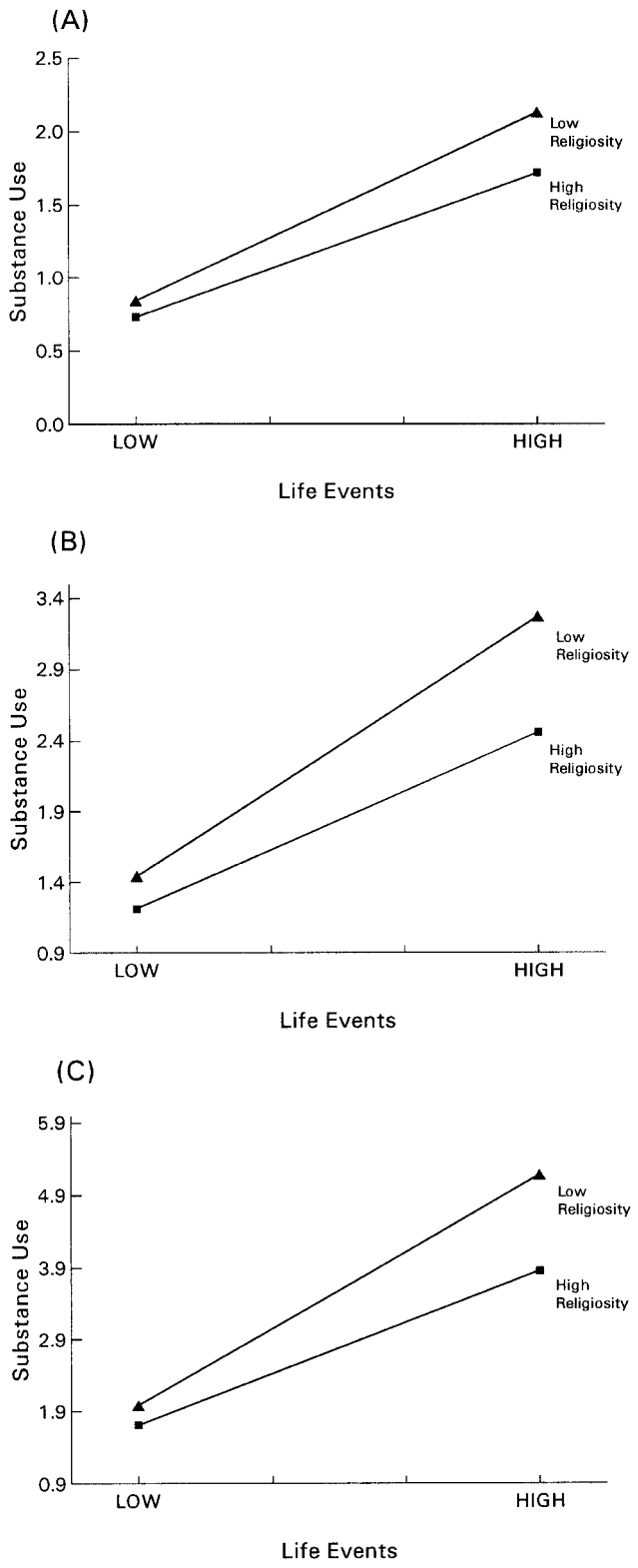



*Figure 1.* Interactions for Life Events × Religiosity. Panel A: 7th grade; Panel B: 8th grade; Panel C: 9th grade. Plotted are estimated values of composite substance use score for cases at various combinations of predictor variables. Note that the scale of the *y*-axis differs across grades because rates of substance use increase over time.

11.07, $p < .0001$, and to greater rate of increase in substance use over time ($\beta = .26$), $t(1180) = 6.33$, $p < .0001$. Significant paths for demographic variables indicated a lower rate of growth in substance use for African Americans ($\beta = -.20$), $t(1180) = 5.07$, $p < .0001$, and for Hispanics ($\beta = -.14$), $t(1180) = 3.67$, $p < .001$. The predictors accounted for 12% of the variance in initial level of use and 9% of the variance in rate of growth in use.

We tested the buffering effect of religiosity with a multiple-group analysis. We divided the sample into subgroups based on religiosity score from 7th grade, and we analyzed the growth model for different subgroups as specified above (Rigdon, Schumacker, & Wothke, 1998).[5] The base model, analyzed simultaneously in two subgroups with all parameters freely estimated, is presented in Figure 2 with coefficients for the low- and high-religiosity subgroups; unstandardized coefficients are presented because standardized coefficients cannot be directly compared across subgroups. The paths from life events to substance use intercept and slope were both reduced in the high-religiosity subgroup. We evaluated this effect with a multiple-group test, constraining these two coefficients to be equal across subgroups. This test resulted in a difference chi-square ($df = 2$) of 7.48, which is significant ($p < .025$), and indicates that the impact of life events on intercept and slope was significantly lower for the high-religiosity subgroup. Tests for the individual paths indicated that the difference chi-square ($df = 1$) for the path from life events to substance use intercept was 3.87 ($p = .05$), and the difference chi-square ($df = 1$) for the path from life events to substance use slope was 4.04 ($p < .05$); hence each of the paths differed significantly according to level of religiosity. Thus, the buffering effect of religiosity was demonstrated in a longitudinal context with control for demographic characteristics.[6] The ratio of the paths from life events to substance use constructs in the high- versus low-religiosity groups, an index of the moderation effect size, was .71 for the path from life events to substance use intercept and .59 for the path from life events to substance use slope.

## Discussion

The aim of this research was to test the prediction that religiosity has a buffering effect for alcohol and other substance use over the period from early to middle adolescence. The data we analyzed were obtained from a representative sample of urban adolescents. Inverse correlations of religiosity with adolescents' alcohol, tobacco, and marijuana use were found. Results from multiple regression analyses showed significant Life Events × Religiosity

[5] We tested subgroupings based on median split, tertiles, and quartiles (Rigdon et al., 1998), and found that the interaction effect was best represented by the contrast of the lowest tertile on religiosity with the upper two tertiles. Hence, we performed the multiple-group modeling as a two-group analysis, which contrasted the lowest one third of the sample (analytic $n = 357$ cases) with the upper two thirds of the sample (analytic $n = 825$ cases).

[6] A separate multiple-group test with family events had a difference chi-square ($df = 2$) of 5.72 ($p = .05$), and a separate test with adolescent events had a difference chi-square ($df = 2$) of 5.66 ($p = .05$). In each case, the two paths from events to intercept and slope were lower for the high-religiosity subgroup.

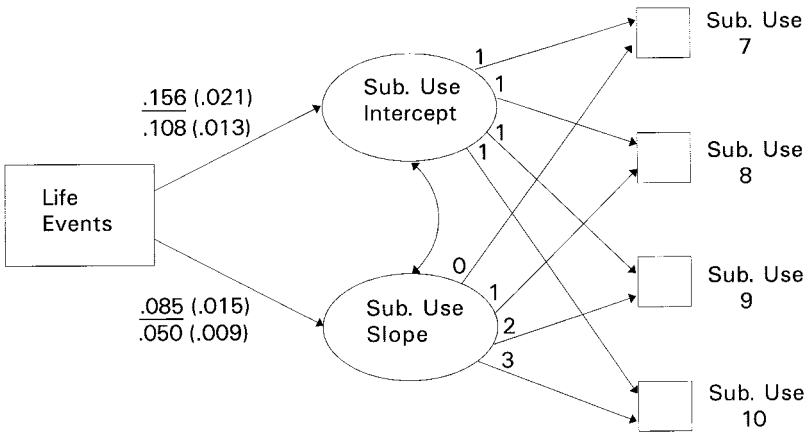



*Figure 2.* Multiple-group latent growth model for adolescent substance (Sub.) use from 7th grade to 10th grade, with life events at 7th grade exogenous. Straight single-headed arrows are path effects; the curved double-headed arrow is a covariance. Values are unstandardized coefficients (standard errors are in parentheses) except for factor loadings, which are fixed. Coefficients above the line are for the low-religiosity group; coefficients below the line are for the high-religiosity group.

buffering interactions, consistent with prediction. Buffering interactions were observed for cigarette smoking, heavy drinking, and marijuana use, with effects replicated over the study period, and these findings were obtained with control for demographic characteristics. The buffering effect of religiosity was examined in a longitudinal context with latent growth modeling, and moderation was observed for the impact of life events on initial level of substance use and on rate of growth in use over time.

Consideration of effect sizes indicated that although the cross-sectional correlations of religiosity with substance use (Table 1) were modest in magnitude for individual indices, effects were observed for several indices and were consistent over time. The effect size for the moderation for latent growth constructs (Figure 2) was such that the effect of life stress on rate of increase in substance use was about half as large in the high-religiosity group. Thus, this research demonstrates that buffering effects of religiosity for adolescent substance use are a real phenomenon and are of a magnitude that may have preventive significance.

The present research had methodological advantages in that it was based on a sizable sample, a desirable attribute for demonstrating interaction effects (Aiken & West, 1991; Chaplin, 1991). In addition, the study tapped a range of life events and obtained repeated assessments of the participants so that replicability of effects could be determined. We found that the basic effects for religiosity were fairly replicable, although there was evidence that the main effects increased over the study period, whereas the buffering effects seemed to be strongest during early adolescence. These observations may represent developmental trends but would need to be replicated in other studies in order to build a firmer base for developmental theory about the effects of religiosity.

Some aspects of the present research could be noted as possible limitations. This study assessed frequency of alcohol and other substance use, and the relation of religiosity to diagnostic indices of substance abuse or dependence may be considered in further research. Religiosity was indexed with one type of measure, but recent theoretical work suggests that the broader construct of religiousness is multidimensional, including facets of belief, participation, and coping (George, Larson, Koenig, & McCullough, 2000), and comprising domains of formal religious involvement and nonreligious spirituality that may not be highly correlated (John E. Fetzer Institute, 1999). These different aspects of religiosity could be compared in further research. Finally, we studied religiosity and substance use during the early part of adolescence, and studies conducted to investigate effects of religiosity in adolescence or early adulthood would be desirable.

### *Analyses for Demographic and Events Subgroups*

Specific analyses indicated that buffering effects were observed at some point in the study for all demographic subgroups. There was a suggestion that effects of religiosity were more prominent for females, but this difference was not totally consistent over the study period. Although previous research with adults has suggested demographic differences, these were predominantly cross-sectional studies, and there is little evidence of the replicability of demographic effects. In the present research, buffering effects were observed in the total sample at several time points and for several substance use indices, so given the number of demographic subgroups in the sample it was no simple matter to conduct comprehensive tests for demographic differences while also minimizing the number of statistical tests. Our approach relied on the observed replicability of effects for a composite substance use score, and although this approach may be conservative, we conclude that effects of religiosity in adolescence are not limited to a particular demographic subgroup. In further research it would be desirable to make efforts to determine the replicability as well as the nature of demographic effects.

We examined a suggestion from adult research that buffering effects occur only for family-related events (Strawbridge et al., 1998). This was perhaps not a strong test (because of the intercorrelation of event subtypes), but for adolescents we were unable to support the notion because buffering effects were observed with respect to events that primarily affected the family as well as for events that directly affected the adolescent him- or herself. We note that there are several differences between the studies; for example, the participants in Strawbridge et al.'s (1998) study were

50 years or older, the measure of religiosity was somewhat different, and the nonfamily events were of a largely different nature. However, in future research it would seem justified to consider a variety of life events spanning the range of individual and family domains.

### *The Process of Buffering*

Buffering effects for adolescent substance use were observed consistently in this study. These effects could occur through one or more different processes. In theory, a protective resource could act to directly counter the impact of a stressor; for example, financial support would directly reduce the impact of financial problems (Peirce, Frone, Russell, & Cooper, 1996). However, we think it unlikely that religiosity operates in such a manner, because it probably affects multiple psychosocial domains. At the individual level, buffering could occur because religiosity affects attitudes and values. For example, religiosity may be related to perceived meaning and purpose in life (George et al., 2000; Newcomb & Harlow, 1986) and could also be related to values and attitudes about substance use (Brody et al., 1996). These factors could moderate the impact of negative life events through cognitive or attitudinal mechanisms.

In theory, buffering might also occur because of relations to coping processes, social networks, or both. Religiosity may influence the way people tend to cope with problems and their perceptions about the coping functions of substance use (Pargament, 1997; Wills & Hirky, 1996), hence an indirect mechanism through coping processes could act to alter the effects of life stress on various outcomes. In the domain of social processes, religiosity could be associated with the characteristics of an adolescent's network of adults and peers and may be related to integration in the larger community through participation in social and service activities (Brook, Balka, Brook, Win, & Gursen, 1998; Umberson, 1987; Wallace & Williams, 1997), a factor that also could work to produce buffering effects (S. Cohen & Wills, 1985). Previous research and theory have emphasized that factors related to substance use can be moderated in several different ways (e.g., Wills & Cleary, 1996; Zucker, 1994), so for further research it seems appropriate to consider multiple processes through which religiosity can affect functioning.

## References


Adlaf, E. M., & Smart, R. G. (1985). Drug use, religious affiliation, feelings, and behavior. *British Journal of the Addictions, 80,* 163–171.

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions.* Newbury Park, CA: Sage.

Amey, C. H., Albrecht, S. L., & Miller, M. K. (1996). Racial differences in adolescent drug use: The impact of religion. *Substance Use & Misuse, 31,* 1311–1332.

Bahr, S. J., Maughan, S. L., Marcos, A. C., & Li, B. (1998). Family, religiosity, and the risk of adolescent drug use. *Journal of Marriage and the Family, 60,* 979–992.

Barnes, G. M., Farrell, M. P., & Banerjee, S. (1994). Family influences on alcohol abuse and other problem behaviors among Black and White adolescents in a general population sample. *Journal of Research on Adolescence, 4,* 183–201.

Brody, G. H., Stoneman, Z., & Flor, D. (1996). Parental religiosity, family processes, and youth competence in rural, two-parent African-American families. *Developmental Psychology, 32,* 696–706.

Brook, J. S., Balka, E. B., Brook, D. W., Win, P. E., & Gursen, M. D. (1998). Drug use among African Americans: Ethnic identity as a protective factor. *Psychological Reports, 83,* 1427–1446.

Chaplin, W. F. (1991). The next generation of moderator research in personality psychology. *Journal of Personality, 59,* 143–178.

Chassin, L., Pillow, D. R., Curran, P. J., Molina, B. S. G., & Barrera, M. (1993). Relation of parental alcoholism to early adolescent substance use. *Journal of Abnormal Psychology, 102,* 3–19.

Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98,* 310–357.

Dubow, E. F., & Tisak, J. (1989). The relation between stressful life events and adjustment in elementary school children: The role of social support and problem-solving skills. *Child Development, 60,* 1412–1423.

Foshee, V. A., & Hollinger, B. R. (1996). Maternal religiosity, adolescent social bonding, and adolescent alcohol use. *Journal of Early Adolescence, 16,* 451–468.

George, L. K., Larson, D. B., Koenig, H. G., & McCullough, M. E. (2000). Spirituality and health: What we know, what we need to know. *Journal of Social and Clinical Psychology, 19,* 102–116.

Hadaway, C. K., Elifson, K. W., & Petersen, D. M. (1984). Religious involvement and drug use among urban adolescents. *Journal for the Scientific Study of Religion, 23,* 109–128.

Jessor, R., Chase, J. A., & Donovan, J. E. (1980). Psychosocial correlates of marijuana use and problem drinking in a national sample of adolescents. *American Journal of Public Health, 70,* 604–613.

Jessor, R., & Jessor, S. L. (1977). *Problem behavior and psychosocial development.* New York: Academic Press.

John E. Fetzer Institute. (1999). *Multidimensional measurement of religiousness/spirituality for use in health research.* Kalamazoo, MI: Author.

Johnston, L. D., O'Malley, P. M., & Bachman, J. G. (1995). *National survey results on drug use from the Monitoring the Future study, 1975–1994. Volume 1: Secondary school students.* Rockville, MD: National Institute on Drug Abuse.

Kendler, K. S., Gardner, C. O., & Prescott, C. A. (1997). Religion, psychopathology, and substance use and abuse: A multimeasure, genetic–epidemiologic study. *American Journal of Psychiatry, 154,* 322–329.

Krause, N. (1997). Stressors in highly valued roles, religious coping, and mortality. *Psychology and Aging, 13,* 242–255.

Levin, J. S. (1996). How religion influences morbidity and health: Reflections on natural history, salutogenesis and host resistance. *Social Science and Medicine, 43,* 849–864.

McCullough, M. E., Hoyt, W. T., Larson, D. B., Koenig, H. G., & Thoresen, C. (2000). Religious involvement and mortality: A meta-analytic review. *Health Psychology, 19,* 211–222.

Murray, D. M., & Perry, C. L. (1987). The measurement of substance use among adolescents. *Addictive Behaviors, 12,* 225–233.

Muthén, L. K., & Muthén, B. O. (1998). *Mplus user's guide.* Los Angeles: Muthén & Muthén.

Needle, R., Su, S., & Lavee, Y. (1989). A comparison of the empirical utility of three composite measures of adolescent drug involvement. *Addictive Behaviors, 14,* 429–441.

Newcomb, M. D., & Harlow, L. L. (1986). Life events and substance use among adolescents: The role of loss of control and perceived meaninglessness in life. *Journal of Personality and Social Psychology, 51,* 564–577.

Pargament, K. I. (1997). *The psychology of religion and coping: Theory, research, practice.* New York: Guilford Press.

Park, C., Cohen, L. H., & Herb, L. (1990). Intrinsic religiousness and religious coping as life stress moderators for Catholics versus Protestants. *Journal of Personality and Social Psychology, 59,* 562–574.

Peirce, R. S., Frone, M. R., Russell, M., & Cooper, M. L. (1996). Financial stress, social support, and alcohol involvement: A longitudinal test of the

buffering hypothesis in a general-population survey. *Health Psychology, 15,* 38–47.

Resnick, M. D., Bearman, P. S., Blum, R. W., Bauman, K. E., Harris, K. M., Jones, J., et al. (1997). Findings from the National Longitudinal Study on Adolescent Health. *Journal of the American Medical Association, 278,* 823–832.

Rigdon, E. E., Schumacker, R. E., & Wothke, W. (1998). A comparative review of interaction and nonlinear modeling. In R. E. Schumacker & G. A. Marcoulides (Eds.), *Interaction and nonlinear effects in structural equation modeling* (pp. 1–16). Mahwah, NJ: Erlbaum.

Siegel, J. M., & Kuykendall, D. H. (1990). Loss, widowhood, and psychological distress among the elderly. *Journal of Consulting and Clinical Psychology, 58,* 519–524.

Strawbridge, W. J., Shema, S. J., Cohen, R. D., Roberts, R. E., & Kaplan, G. A. (1998). Religiosity buffers effects of some stressors on depression but exacerbates others. *Journal of Gerontology: Social Sciences, 53B,* S118-S126.

Umberson, D. (1987). Family status and health behaviors: Social control as a dimension of social integration. *Journal of Health and Social Behavior, 28,* 306–319.

U.S. Department of Commerce. (1993). *1990 Census of the Population: Social and economic characteristics (New York).* Washington, DC: U.S. Government Printing Office.

Wallace, J. M., Jr., & Williams, D. R. (1997). Religion and adolescent health-compromising behavior. In J. Schulenberg, J. L. Maggs, & K. Hurrelmann (Eds.), *Health risks and developmental transitions during adolescence* (pp. 444–468). New York: Cambridge University Press.

Williams, D. R., Larson, D. B., Buckler, R. E., Heckman, R. C., & Pyle, C. M. (1991). Religion and psychological distress in a community sample. *Social Science and Medicine, 32,* 1257–1262.

Wills, T. A. (1990). Stress and coping factors in the epidemiology of substance use. In L. T. Kozlowski, H. M. Annis, H. D. Cappell, F. B. Glaser, M. S. Goodstadt, Y. Israel, et al. (Eds.), *Research advances in alcohol and drug problems* (Vol. 10, pp. 215–250). New York: Plenum.

Wills, T. A., Blechman, E. A., & McNamara, G. (1996). Family support, coping and competence. In E. M. Hetherington & E. A. Blechman (Eds.), *Stress, coping, and resiliency in children and the family* (pp. 107–133). Hillsdale, NJ: Erlbaum.

Wills, T. A., & Cleary, S. D. (1996). How are social support effects mediated: A test for parental support and adolescent substance use. *Journal of Personality and Social Psychology, 71,* 937–952.

Wills, T. A., & Hirky, A. E. (1996). Coping and substance abuse. In M. Zeidner & N. S. Endler (Eds.), *Handbook of coping* (pp. 279–302). New York: Wiley.

Wills, T. A., McNamara, G., Vaccaro, D., & Hirky, A. E. (1996). Escalated substance use: A longitudinal grouping analysis from early to middle adolescence. *Journal of Abnormal Psychology, 105,* 166–180.

Wills, T. A., Vaccaro, D., & McNamara, G. (1992). The role of life events, family support, and competence in adolescent substance use. *American Journal of Community Psychology, 20,* 349–374.

Windle, M. (1997). Latent variable approaches to modeling change in adolescent alcohol involvement. In K. J. Bryant, M. Windle, & S. G. West (Eds.), *The science of prevention: Methodological advances from alcohol and substance abuse research* (pp. 43–78). Washington, DC: American Psychological Association.

Wolchik, S. A., Ruehlman, L. S., Braver, S. L., & Sandler, I. N. (1989). Social support of children of divorce. *American Journal of Community Psychology, 17,* 485–501.

Zucker, R. A. (1994). Pathways to alcohol problems. In R. A. Zucker, G. M. Boyd, & J. Howard (Eds.), *The development of alcohol problems* (pp. 255–289). Rockville, MD: National Institute on Alcohol Abuse and Alcoholism.

Received July 30, 2001
Revision received January 11, 2002
Accepted January 18, 2002 ■

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