Alcohol Milestones, Risk Factors, and Religion/Spirituality in Young Adult Women

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ABSTRACT. Objective: The alcoholism research literature has long reported a significant, reliable, and inverse association between alcohol use disorders and religion/spirituality (R/S), and this is also evident in the period of highest risk—adolescence and young adulthood. In the treatment area, both clinical and mutual-help programs for alcohol use disorders often include a spiritual component, and outcome studies validate the efficacy of such programs. Even so, the alcoholism–R/S relationship is little understood. **Method:** The current study examined data from an existing sample of 4,002 female adolescents/young adults and their families. Data analyses examined five demographic, nine R/S, and eight risk-factor variables as predictors of five alcohol milestones: initial drink, first intoxication, regular use, heavy consumption, and alcohol dependence. **Results:** Results affirmed the known association be-

tween alcoholism risk factors and alcohol use milestones and also found moderate to strong associations between most R/S variables and these risk factors and milestones. A multivariate model simultaneously examining both sets of variables found that specific risk factors and specific R/S variables remained significant predictors of alcohol use milestones after accounting for all other variables. Mediation and moderation tests did not find evidence that R/S accounted for or qualified the relationship between alcohol risk factors and alcohol milestones. **Conclusions:** This study confirmed the multidimensional role of R/S influences within the etiological network of alcoholism risk and protective factors in adolescents/young adults and found R/S dimensions to be independent and substantial influences on alcohol use disorders rather than mediators or moderators of other risks. (*J. Stud. Alcohol Drugs*, 73, 34–43, 2012)

A GENERALLY NEGATIVE ASSOCIATION has been reported between religion/spirituality (R/S) variables and alcoholism as well as its concomitant psychiatric disorders (Kendler et al., 1997; Koenig, 1998). Furthermore, (a) “religiosity has a stronger relationship with substance use and abuse than with current or lifetime psychiatric symptoms or disorders” (Kendler et al., 1997, p. 327), (b) outcome research shows recovery to be sustained by ongoing R/S involvement (Booth and Martin, 1998), and (c) clinical treatment studies confirm the efficacy of alcoholism treatment programs with a spirituality component (such as the 12-step program) (Project MATCH Research Group, 1997). Of particular interest here is that a substantial literature shows R/S to be inversely associated with adolescent drinking; alcohol use disorders; drug use, abuse and dependence; and delinquency (e.g., Booth and Martin, 1998; Galanter, 2006; Jessor and Jessor, 1977).

Adolescence and young adulthood include both the initial emergence of alcohol behaviors and the period of highest alcohol risk (Galanter, 2006), and the alcoholism etiology literature (Sher and Slutske, 2003; Sher et al., 2005) indicates that psychiatric conditions, trauma, and difficult family relations are key contributors to alcohol behavior etiology (Windle and Windle, 2006). Although R/S has been shown to be inversely associated with alcohol behavior and its risk factors, some have argued that R/S effects are largely indirect effects through other factors (Mason and Windle, 2002). The current literature is very limited in characterizing these relationships. A comprehensive profile of significant associations and tests of mediation and moderation is needed to illuminate the nature of these interrelationships.

Clarifying these relationships, however, is not straightforward because both R/S and alcoholism are multidimensional. The different dimensions of R/S have been increasingly studied (Fetzer Institute/National Institute on Aging, 1999; Wulff, 1997). One alcoholism study (Kendler et al., 2003) identified seven R/S factors, five of which were substantially and inversely associated with alcohol dependence (based on *Diagnostic and Statistical Manual, Fourth Edition* [DSM-IV; American Psychiatric Association, 1994], diagnoses). Three R/S dimensions (religious affiliation, religious importance, and religious proscription) were found to be strongly associated with abstinence from alcohol use (Michalak et al., 2007). In an adolescent sample, different R/S dimensions contributed uniquely to delayed onset of alcohol use (Heath

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et al., 1999). The dimensionality of R/S appears to be an important consideration. The dimensionality of alcoholism has been studied in terms of its subtypes (Zucker et al., 1995) and different models of alcoholism etiology. Different sets of risk factors (e.g., psychopathology, trauma, difficult family relations) have been found to be predictive of alcohol outcomes (Kendler and Prescott, 2006; Sher et al., 2005). Making relations even more complex is that R/S factors are also inversely associated with most alcohol risk factors (Koenig et al., 2001).

The current study undertook the examination of the interrelationships among nine R/S variables (representing different R/S dimensions), eight known alcoholism risk factors (representing the two subtypes and their models of alcoholism etiology), and five alcohol use milestones (representing stages in the course of drinking from the initial drink to alcohol dependence). Tests of association, mediation, and moderation were conducted on a large sample of adolescent and young-adult female twins, a sample in the period of highest risk. The goal was to document the overarching pattern of significant effects by examining the following: (a) alcohol risk factors and alcohol milestones, (b) R/S variables and alcohol milestones, (c) R/S variables and alcohol risk factors, (d) the multivariate relationship between R/S factors and alcohol risk factors, and (e) tests of mediation and moderation.

Method

The data used for this study were obtained from the Missouri Adolescent Female Twin Study (National Institute on Alcohol Abuse and Alcoholism Grant AA09022; principal investigator Heath), which, through two sequential grant periods, conducted two longitudinal assessments of female adolescent twins and their parents. This was a prospective study focused on the determinants of alcoholism risk in young women and included comprehensive assessments of alcohol use, risk factors, and religious characteristics. This study targeted all live-born twin pairs in Missouri between 1975 and 1987; of those identified, an 87% participation rate was achieved in the initial interview, thus providing a large representative sample of the population of female twins in Missouri (Heath et al., 1999).

Further, twins have been found to be representative of the larger population from which they were drawn (Johnson et al., 2002). Attrition analyses were conducted before current analyses that were based on geo-social information derived from census block data. Results indicated some minor demographic differences between participants and nonparticipants in the initial data collection. At follow-up, the participation rate was 84% of those completing Wave 1. Those lost to follow-up were more likely to have lower income, non-White race, and paternal history of alcoholism. Attrition bias for current purposes was deemed insignificant and in a conser-

vative direction. It should be noted that the twin feature of this data set was relevant only to a subsequent component of this project and was not used here.

In the original study, assessments included an initial parental zygosity interview, diagnostic interviews, and psychosocial data from the parents of 2,369 families and from each adolescent twin girl between the ages of 13 and 19 years ($n = 3,582$) together with an adolescent questionnaire ($n = 2,080$) that assessed additional religion items. There were 434 Black adolescent girls in this sample; other adolescents were almost entirely of European ancestry. Five years later, all originally targeted adolescent/young adult women were again contacted for participation. Median age at baseline and follow-up assessments was 15.8 and 21.8 years, respectively. When compiled as a cross-sectional data set, 4,002 female offspring cases were available; later data were used when two waves had been collected. It was expected that female adolescents/young adults would have somewhat lower rates of alcohol use and somewhat greater religiousness compared with male adolescent/young adult samples, thus providing conservative estimates of alcohol-milestone prevalence and perhaps greater sensitivity in detecting the R/S effects of interest.

Assessment and selection of variables

Four domains of data were drawn for the current study. Demographic variables were obtained to adjust for potential confounds. R/S variables representing several R/S dimensions were selected as key predictors. Risk factors associated with major life stressors and psychiatric disorders were obtained because they are hypothesized mediators of alcohol risk. Items describing five alcohol use milestones were selected as outcome variables. Because many items had binary response sets, continuous variables were transformed into dichotomous form for consistency with categorical items. Table 1 lists the four domains, the variables, their operationalization, and the prevalence of endorsements in the sample.

Specifically, demographic variables included parental education as a dichotomous indicator of fathers and mothers who attended at least some college. Because education data were partially missing, binary variables identified cases with missing data for both father and mother. This permitted assessment of the relationship between missing education data and alcohol outcome and allowed a zero to be entered (rather than a system missing) so as to include the case in most computations. Other demographics included socioeconomic status based on mother's report of family income transformed into two binary income variables representing the higher and lower quartiles of income. Also, offspring age indicated subjects who were 21 years of age or older.

R/S variables represented several different R/S dimensions. Each had acceptable reliability (test-retest) and/or

TABLE 1. Prevalence of endorsements for all variables

Variable	Operationalization	Prevalence
Demographic characteristics		
Father's education	>12 years	54.6%
Father's education data missing	if missing	41.7%
Mother's education	>12 years	75.6%
Mother's education data missing	if missing	16.2%
Higher income	≥\$62,500	14.8%
Lower income	≤\$25,500	19.7%
Offspring age	≥21 years	55.8%
Religion/spirituality variables		
Religious motivation–devotion	Sum of 4 item ratings dichotomized by median-split	58.9%
Religious attendance	≥1 time per week	27.1%
Existential well-being	Sum of 4 item ratings dichotomized by median-split	56.7%
Religious rules against any alcohol use	1 item	41.1%
Raised with a childhood religious affiliation	Age: 6–13 years	53.4%
Differentiating religious affiliation	1 item (current)	47.5%
Accommodating religious affiliation	1 item (current)	12.3%
Catholic religious affiliation	1 item (current)	22.5%
No religious affiliation	1 item (current)	17.7%
Risk factors		
ADHD	≥6 inattention symptoms or ≥6 hyperactive symptoms for ≥6 months	15.2%
ODD	≥4 ODD symptoms for ≥6 months	15.6%
CD	≥3 CD symptoms for ≥12 months	7.5%
MDD	≥5 MDD symptoms for ≥2 weeks	30.9%
Traumatic event	Life at risk in an accident, disaster, witnessed a killing, raped, molested, physically attacked, abused, neglected, threatened with weapon, or kidnapped	47.3%
Parenting inconsistencies	1 item	42.6%
Parent–child arguments	1 item: often	21.1%
Parental divorce or separation	1 item	33.3%
Alcohol milestones		
Any alcohol onset (a first full drink)	Initial full drink	84.1%
Ever intoxicated	Initial drunk	63.8%
Ever a regular user	1 drink per month (6 months) or 1 drink per week (8 weeks)	47.9%
Ever a heavy user	Median split on heaviness factor score	9.5%
Ever alcohol dependent	DSM-IV alcohol-dependence criteria	8.0%

Notes: ADHD = attention-deficit/hyperactivity disorder; ODD = oppositional defiant disorder; CD = conduct disorder; MDD = major depressive disorder; DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*.

internal consistency (Cronbach's α): (a) religious motivation–devotion was a composite variable combining (a1) four religious-importance items (see Jessor and Jessor, 1977) ($\alpha = .86$; e.g., How important is it to you to be able to rely on your religious beliefs as a guide for day-to-day living?); (a2) four religious well-being items from the Spiritual Well-Being Scale (see Ellison, 1983) (test–retest = .94; $\alpha = .82$; e.g., I feel most fulfilled when I'm in close communication with God); and (a3) an R/S self-rating item (e.g., How strongly religious or spiritually oriented do you consider yourself to be?). A dichotomous motivation–devotion indicator was constructed using a median split. (b) Religious attendance was a binary indicator of weekly or more frequent attendance at religious services. (c) Existential well-being (four existential items from the Spiritual Well-Being Scale [Ellison, 1983])

were a nontheistic measure of spiritual well-being (test–retest = .90; $\alpha = .81$) that was transformed to a dichotomous indicator using a median split. (d) Family endorsement that their religious affiliation had religious rules against any alcohol use became a religious rules indicator. (e) Mothers and offspring both identified the religious affiliation of each of her children at ages 6–13 years from a list of 20 choices including “no religious affiliation,” which were categorized into four affiliation types: differentiating, accommodating, Catholic, and no religious affiliation. Development of this religious-affiliation typology has been described in detail, and its relevance has been validated in two previous studies (Haber and Jacob, 2007, 2009); it is based on differences in the degree to which religious beliefs (such as evolution, the return of Jesus Christ, and healing through prayer) and

behaviors (such as gambling, dancing, and censorship) are consistent with the larger culture.

Accommodating affiliations are more similar and included Methodist, Lutheran, and Presbyterian churches ($n = 436$). Differentiating affiliations are more different and included Baptist, Church of Christ, and other Protestant church affiliations ($n = 1,683$). Catholic affiliation ($n = 797$) included both attributes and was examined separately. "No religion" was the reference group ($n = 625$ cases). (Note that 460 cases [11.5%] were unclassified because of minimal representation.) Substantial within-group heterogeneity is evident within these categories, but between-group main effects are sufficiently robust to validate their use.

Risk factors and alcohol milestones were assessed using an adapted version of the Semi-Structured Assessment of the Genetics of Alcoholism-II (SSAGA-II) and its companion child (C-SSAGA-C) and adolescent (C-SSAGA-A) interviews. The SSAGA was based on well-validated items used in other psychiatric research interviews (see Bucholz et al., 1994).

Risk factors represent the well-documented comorbid psychiatric literature, and stressful life events have been reliably linked to alcohol outcomes (Kendler and Prescott, 2006; Zucker and Gomberg, 1986). Included were four DSM-IV (American Psychiatric Association, 1994) disorders, including attention-deficit/hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), conduct disorder (CD), and major depressive disorder (MDD). The reliability of SSAGA diagnoses has been assessed, and test-retest reliabilities were high, with agreement ranging from $\kappa = .70$ to $\kappa = .90$ (Hesselbrock et al., 1999). Stressful life events were SSAGA-II questions on trauma (any endorsement of a life-threatening accident; a disaster; witnessing a killing; being raped; being molested; being physically attacked, physically abused, or neglected; or being threatened with a weapon or kidnapped) and selected family characteristics (single offspring items on inconsistent parental rule enforcement, frequent parent-child arguments, or parental divorce or separation).

Five alcohol milestones, also drawn from the SSAGA-II offspring alcohol assessment, were selected as outcome variables: (a) ever drank a full drink of alcohol, (b) ever intoxicated, (c) ever a regular drinker (one drink per month for 6 months or one drink per week for 8 weeks), (d) ever a heavy drinker (see below), and (e) ever alcohol dependent. Each was determined from endorsements within the structured interview except "ever a heavy drinker," which identified those above the median on a heaviness-of-use factor score based on (a) maximum drinks ever consumed in a 24-hour period, (b) number of days in the past year that five or more drinks were consumed, (c) quantity-frequency score during the heaviest period of drinking, and (d) number of days intoxicated in the heaviest drinking year. The prevalence of endorsements for each of these five milestones is provided in Table 1.

Date analysis

Given the categorical nature of alcohol milestones, univariate and multivariate tests of association were conducted using logistic regression. All analyses controlled for demographic variables: paternal and maternal education, high-income, low-income, and offspring age. To identify patterns of associations, univariate analyses examined the risk factor-alcohol relationship (eight risk factors and five alcohol milestones, a 40-test profile), the R/S-alcohol relationship (nine R/S variables and five alcohol milestones, a 45-test profile), and the R/S-risk factor relationship (nine R/S variables and eight risk factors, a 72-test profile).

To address redundancy and identify unique variance among the R/S variables and alcohol-dependence risk factors in predicting alcohol milestones, a multivariate analysis simultaneously modeled five demographic, nine R/S, and eight risk-factor variables as predictors of a given alcohol milestone. To evaluate whether R/S mediated or moderated the relationship between any alcohol risk factor and any alcohol milestone, bivariate correlations and logistic regression models were constructed. Concerning mediation, (a) analyses examined the bivariate correlation between (i) a religion variable and a risk factor and (ii) the religion variable and an alcohol milestone; if both were significant, (b) analyses used multivariate logistic regression to examine the association between the risk factor and the alcohol milestone without and then with the religion variable as a predictor in the model.

Mediation was established if a significant association between the risk factor and the alcohol milestone became nonsignificant when the religion variable was added to the equation and the religion variable was then significant. Mediation tests produced a 360-test profile. Then, to address moderation, a multivariate logistic regression model was designed to include (a) a risk-factor main effect, (b) a religion variable main effect, and (c) a computed multiplicative term characterizing the interaction of these two main effects in the prediction of each of the five alcohol use milestones, also a 360-test profile.

In comparing groups of variables within each test and across milestones, demographics, risk factors, and R/S factors were entered as separate blocks. Estimates of explained variance in a given block were obtained using Nagelkerke's pseudo R^2 for logistic regression. The goal of these analyses was to characterize patterns of significance among variables known to be related. Interest was not in a few significant findings drawn from many tests; doing so would constitute a multiple testing problem.

Given that a twin sample was used for these tests, there was a chance that common family resemblance (higher correlations between members of the same family) could skew results. For that reason, all tests were replicated with adjustment for the nonindependence of traits between family

members. For convenience, these tests were conducted using Stata software (Version 7; StataCorp LP, College Station, TX).

Results

Sample description

The current sample included 4,002 female adolescents and their parents in Missouri. As seen in Table 1, the majority of both fathers and mothers had attended some college (fathers: 54.6%; mothers: 75.6%). For 14.8% of families, household income was in the highest quartile ($\geq \$62,500$); for 19.7% of families, household income was in the lowest quartile ($\leq \$25,500$). (Income is reported in U.S. dollars.) The majority of offspring were young adults (55.8%), and most parents indicated that their children had some religious background (82.3% endorsed a religion). About a quarter of

offspring said that they currently attend religious services at least weekly (27.1%). Most offspring (84.1%) reported having had at least one full drink in their lives, 63.8% had been intoxicated, 47.9% had been regular alcohol users, 9.5% had heavy alcohol use in their history, and 8.0% had met criteria for alcohol dependence at some point in their lives. Concerning other psychopathology, parents reported that 15.2% met ADHD criteria. In addition, 15.6% of offspring reported ODD during their lifetime, 7.5% met criteria for CD, 30.9% met MDD criteria, and 47.3% endorsed at least one traumatic experience during their lifetime.

Univariate analyses first examined patterns of association among alcohol-dependence risk variables, alcohol milestones, and R/S variables. As seen in Table 2, part 2a, analysis of alcohol risk factors and alcohol milestones (after controlling for demographic variables) found that all eight risk factors were significantly associated with all five alcohol milestones, with only one exception in 40 tests: ADHD

TABLE 2. Univariate models showing regression coefficients, significance, and direction of effects for the relationships among risk factors, religion, and alcohol milestones

	Alcohol onset <i>b</i>	Intoxication <i>b</i>	Regular use <i>b</i>	Heavy use <i>b</i>	Alcohol dependence <i>b</i>			
2a. Risk factors by alcohol milestones								
ADHD	0.52***	0.30**	0.04	0.35***	0.66***			
ODD	0.34*	0.30**	0.39***	0.46***	0.76***			
CD	1.41***	1.04***	0.94***	0.92***	1.48***			
MDD	0.53***	0.34***	0.45***	0.59***	1.00***			
Trauma	0.50***	0.49***	0.44***	0.42***	0.90***			
Parenting inconsistencies	0.46***	0.29***	0.26***	0.35***	0.44***			
Parent–child arguments	0.58***	0.50***	0.36***	0.40***	0.57***			
Parental divorce/separation	0.53***	0.40***	0.33***	0.38***	0.57***			
	Alcohol onset <i>b</i>	Intoxication <i>b</i>	Regular use <i>b</i>	Heavy use <i>b</i>	Alcohol dependence <i>b</i>			
2b. Religion by alcohol milestones								
Motivation–devotion	-1.13***	-0.97***	-0.83***	-0.91***	-0.44***			
Attendance weekly +	-1.62***	-1.46***	-1.09***	-1.26***	-0.98***			
Existential well-being	-0.42***	-0.38***	-0.29***	-0.37***	-0.64***			
Religious rules	-0.50***	-0.51***	-0.54***	-0.38***	-0.06			
Childhood religion	-0.80***	-0.92***	-0.86***	-0.76***	-0.07			
Differentiating affiliation	-1.06***	-0.97***	-0.88***	-0.82***	-0.14			
Accommodating affiliation	0.50**	0.18	0.25*	0.16	-0.20			
Catholic religion	0.90***	0.92***	0.81***	0.71***	0.13			
No religion	0.61***	0.55***	0.37***	0.38***	0.22			
	ADHD <i>b</i>	ODD <i>b</i>	CD <i>b</i>	MDD <i>b</i>	Trauma <i>b</i>	Parenting inconsistencies <i>b</i>	Parent– child arguments <i>b</i>	Parental divorce/ separation <i>b</i>
2c. Religion by risk factors								
Motivation–devotion	-0.19	-0.22*	-0.33*	-0.042	-0.07	-0.38***	-0.39***	-0.22**
Attendance weekly +	-0.32**	-0.42***	-0.55***	-0.20*	-0.11	-0.44***	-0.34***	-0.41***
Existential well-being	-0.66***	-0.35***	-0.42***	-0.50***	-0.29***	-0.36***	-0.43***	-0.11
Religious rules	0.18	0.23*	0.23	0.11	0.09	0.05	-0.08	0.11
Childhood religion	0.21*	0.16	0.23	0.22**	0.15*	-0.29***	-0.07	0.09
Differentiating affiliation	0.09	0.08	-0.07	0.07	0.07	-0.21**	-0.17*	-0.07
Accommodating affiliation	-0.48**	-0.33*	-0.73**	-0.22	-0.23*	-0.06	0.10	0.14
Catholic religion	-0.29*	-0.31*	-0.42*	-0.24*	-0.34***	0.00	-0.13	-0.23*
No religion	0.39***	0.37**	0.74***	0.29**	0.44***	0.39***	0.33**	0.25**

Notes: Significant tests are in **bold**. Each cell reflects a single univariate test; each univariate test is adjusted by parental education, family income, and child's age. ADHD = attention-deficit/hyperactivity disorder; ODD = oppositional defiant disorder; CD = conduct disorder; MDD = major depressive disorder.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

was not associated with regular alcohol use in these data (a possible artifact of chance). Specifically, 39 of 40 tests (98%) were significant, and 90% were robust in effect size ($p \leq .001$). As anticipated, all significant effects were in the direction of risk.

Concerning R/S influences, as seen in Table 2, part 2b, analysis of the association between nine R/S variables and five alcohol milestones (after controlling for demographic variables) found that 37 of 45 tests (82%) were significant, and 78% were robust ($p \leq .005$), which demonstrated a wide-ranging pattern of R/S–alcohol associations. All three personal R/S variables (motivation–devotion, attendance, and existential well-being) were robustly associated with all five alcohol milestones in the inverse direction (higher religion was associated with lower milestone prevalence rates). All but one of the six religious-affiliation variables were robustly associated with the four earlier alcohol milestones, and none of the six religious-affiliation variables were associated with alcohol dependence. The exception was that accommodating affiliation was associated with only two milestones. How-

ever, the direction of affiliation effects was mixed. Rules against alcohol, childhood rearing in a differentiating affiliation, and current differentiating affiliation lowered milestone prevalence rates for all but alcohol dependence (which was nonsignificant). On the other hand, two religious-affiliation variables and the “no-religious-affiliation” variable, if significant, were positively associated with higher alcohol-milestone prevalence rates (accommodating affiliation at two milestones, Catholic affiliation at four milestones, and “no religious affiliation” at four milestones).

As seen in Table 2, part 2c, analysis of the association between the nine R/S variables and eight alcohol-dependence risk factors indicated a substantial pattern of significant associations but fewer than between R/S and alcohol. Specifically, 43 of 72 tests (60%) were significant, and 28% were robust ($p \leq .005$), which demonstrated an important but more discriminating pattern of associations. Again, the strongest predictors were the three personal R/S variables (motivation–devotion, attendance weekly or more, and existential well-being). All three were negatively associated with ODD,

TABLE 3. Multivariate model showing regression coefficients (*b* scores), significance (***), direction of effects (+ or –), and variance explained (designated as %) for five demographics, eight risk factors, and nine religion variables predicting each of five alcohol milestones.

Variable	Alcohol onset <i>b</i> or %	Intoxication <i>b</i> or %	Regular use <i>b</i> or %	Heavy use <i>b</i> or %	Alcohol dependence <i>b</i> or %
Block 1					
Father's education	0.48	0.61*	0.78**	0.30	0.46
Father's education data missing	0.95	0.34	0.52	0.33	0.48
Mother's education	0.27	-0.01	0.36	0.13	0.23
Mother's education data missing	-0.29	-0.01	0.37	0.11	-0.34
Higher income	0.10	0.11	0.34**	0.12	0.34*
Lower income	-0.40*	-0.40***	-0.13	-0.13	0.05
Offspring age	1.50***	1.07***	1.14***	0.83***	0.16
Variance explained	10.7%	9.1%	11.2%	5.6%	2.8%
Block 2					
ADHD	0.26	0.09	-0.28*	0.06	0.14
ODD	-0.21	-0.02	0.20	0.16	0.01
CD	1.67***	0.94***	0.73***	0.61***	1.09***
MDD	0.25	0.22*	0.40***	0.50***	0.70***
Trauma	0.21	0.35***	0.34***	0.31***	0.58***
Parenting inconsistencies	0.28*	0.01	0.04	0.17*	0.18
Parent-child arguments	0.17	0.16	0.04	0.06	0.03
Parental divorce/separation	0.31*	0.25*	0.19*	0.21*	0.26*
Variance explained	4.2%	3.5%	3.4%	4.8%	9.0%
Block 3					
Existential well-being	0.02	-0.01	-0.02	-0.05	-0.38**
Attendance weekly +	-1.62***	-1.25***	-0.81***	-0.97***	-0.61***
Motivation–devotion	-0.30	-0.32**	-0.42***	-0.51***	-0.22
Childhood religion	-0.18	-0.54***	-0.44***	-0.38**	-0.24
Differentiating affiliation	0.27	0.13	0.05	0.05	0.48*
Accommodating affiliation	0.90***	0.29	0.35*	0.37*	0.19
Catholic religion	1.24***	0.82***	0.70***	0.70***	0.34
No religion	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Religious rules	-0.01	-0.09	-0.14	0.01	-0.04
Variance explained	14.9%	15.6%	11.3%	12.0%	2.4%
Total variance (all blocks)	29.8%	28.2%	25.9%	22.4%	14.2%

Notes: Significant tests are in **bold**. Explained variance computed by Nagelkerke's pseudo R^2 for logistic regression. ADHD = attention-deficit/hyperactivity disorder; ODD = oppositional defiant disorder; CD = conduct disorder; MDD = major depressive disorder; ref. = reference.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

CD, family inconsistency with rules, and parent-child arguments, and one or two of the personal R/S variables were negatively associated with the other risk factors.

Concerning religious affiliation, the no-religious-affiliation group was positively and consistently associated with all eight risk factors. Concerning the three religious-affiliation categories (differentiating, accommodating, and Catholic), each displayed the opposite direction of effects with the risk factors as compared with their relation with the alcohol milestones. That is, in the case of Catholic and accommodating affiliations, endorsement (where significant) was associated with lower prevalence of risk factors (rather than higher). In addition, both childhood and current differentiating affiliations, which were consistently and negatively associated with alcohol milestones (except alcohol dependence), were now mixed: Childhood differentiating affiliation was associated with higher (rather than lower) risk of ADHD, MDD, and exposure to trauma but also with less inconsistency in parental rules. Current differentiating affiliation was largely nonsignificant except for also indicating less inconsistency in parental rules and fewer parent-child arguments.

Given such widespread patterns of association, examination turned to multivariate analyses to adjust for redundancy between the above predictors. All R/S variables and risk factors (and demographics) were simultaneously entered as predictors of a given alcohol milestone. As seen in Table 3, results indicated that, for each alcohol milestone, three to five R/S variables and three to five risk factors remained significant after accounting for all other variables. It was noteworthy that, across all five alcohol milestones, CD, divorce/separation, and religious attendance were always significant, demonstrating the unique contribution of each predictor to every alcohol use stage.

Variance associated with risk factors was less than 5% for the first four alcohol use milestones but was a greater influence on alcohol dependence (9%). After accounting for these influences, R/S variables contributed 11.3%–15.6% of the variance to the first four milestones and dropped to 2.4% when predicting alcohol dependence. Taken together, these models explained 29.8% (onset) to 14.2% (alcohol dependence) of total milestone variance.

Concerning specific predictors, alcohol onset was more likely for those adolescent and young adult girls who had a history of CD, parental inconsistency with rules, parental divorce/separation, and accommodating or Catholic religious affiliation. Alcohol onset was less likely for those who attended religious services weekly or more. The three middle milestones (intoxication, regular use, and heavy use) were more likely to be achieved by those girls with a history of CD, MDD, trauma, parental divorce/separation, and Catholic religious affiliation. These three milestones were less likely for those who attended religious services weekly, those who were motivated/devoted to their religious faith, and those who were raised with a childhood

religious affiliation. The alcohol-dependence milestone was more likely for those with a history of CD, MDD, trauma, parental divorce/separation, or current differentiating religious affiliation. The alcohol-dependence milestone was less likely for those who attended religious services weekly or who had high existential well-being. Note that the personal R/S variables, where significant, were consistently and negatively associated with the alcohol milestones, that religious attendance was the most consistent and strongest of R/S factors, and that affiliation variables were mixed in the direction of their effects.

Finally, to address the question of whether R/S influences are primarily indirect effects on other predictive factors such as alcohol risk factors, tests of mediation and moderation were conducted. Individual mediation tests were constructed by modeling each of the eight risk factors as a predictor of each of the five alcohol-milestone outcomes with one of the nine religious factors modeled as a mediator of this relationship. All possible combinations were tested (a 360-test profile). All bivariate correlations were significant for all dyad combinations between alcohol milestones, risk factors, and religion variables.

As expected, in the first step, almost all logistic regression models confirmed that each risk factor was a significant predictor of each milestone. In the second step, the addition of a religious mediator did not reduce the risk factor's effect below the level of significance. Instead, in almost every case, the addition of a religious variable simply added a second independent significant effect to the predictive model. The variance explained by a given risk factor and a given religion variable was, on average, about the same. As expected, such individual effects were quite small (<3% of total variance). These findings convincingly dismissed support for the mediation hypothesis.

Turning to moderation effects, moderator models included one risk factor and one religion variable as two main effects and an interaction term as a third predictor of an alcohol use milestone. All possible combinations of eight risk factors and nine religion moderators were tested as predictors of each of the five alcohol milestones (360 tests). Across all tests, results almost always indicated that both of the main effects were significant and that the interaction term was not significant. As might be expected by chance, a few significant interactions were found (16 of 360 tests, or 4%). However, these interaction effects were of marginal significance such that, if a correction for the multiple test problem was included (such as increasing the significance level to $p < .01$), virtually all effects became nonsignificant. When graphed, the main effects were primary and interaction effects neither consistent nor discernable. These results provided no evidence of moderation effects.

Finally, as described, a parallel set of all these tests was conducted that included an adjustment for the nonindependence of traits between family members. Only minor

variations were identified that did not lead to any significant differences in the findings reported above.

Discussion

The current study characterized the relationships among (a) known risk factors of alcoholism, (b) R/S variables, and (c) key milestones of alcohol use. Study findings confirmed the association between the etiological risk factors and prevalence rates of alcohol use milestones in this sample, that R/S variables were also associated with all five alcohol use milestones, and that R/S variables were associated with all eight alcohol risk factors. Although it appeared that R/S variables were ideal candidates as risk mediators or moderators, results did not support this conclusion. Instead, results indicated that R/S variables were independent influences on alcohol outcomes. These findings illuminate the importance of R/S factors in the etiology and course of alcoholism and strengthen evidence for the clinical use of R/S as an empirically valid component in alcoholism treatment.

The goal of the current study was to more precisely characterize the relationship between R/S variables and risk factors identified in current models of alcoholism etiology (Sher, 1991; Sher and Slutske, 2003) and their impact on the prevalence of five alcohol use milestones. First examined was the relationship between alcoholism risk factors (four diagnoses: ADHD, ODD, CD, MDD; and four stressful life events: personal trauma, parental inconsistency in applying family rules, parent-child arguments, and marital separation or divorce) and alcohol outcomes in terms of five key milestones (first full drink, intoxication, regular drinking, heavy drinking, and alcohol dependence). As expected, the association between these eight risk factors and all five alcoholism milestones was robustly confirmed. Endorsement of even one of the concomitant disorders or stressful life events predicted higher endorsements of all five alcohol milestones. Given that women have lower base rates of these disorders (Wilsnack, 1996), this sample of adolescent and young adult girls provided a conservative estimate of these effects. Confirmation of the current etiological literature was robust and suggested that these data were a strong foundation for subsequent analyses.

Given the substantial empirical and clinical literature in support of a reliable and inverse alcoholism-R/S relationship (2001), this study then examined the association between R/S variables and alcohol milestones in these data. Results confirmed a robust association between all three of the personal R/S variables (motivation-devotion, religious attendance, and existential well-being) and lower prevalence of every alcohol milestone. In addition, lower prevalence was found for those affiliations having rules against all alcohol use and for the differentiating type of religious affiliation. (These variables are highly correlated). That is, religious groups that described themselves as biblical, conservative,

or fundamental often had rules against all alcohol use, and they exhibited lower prevalence at four of five alcohol milestones. Current literature might suggest that these affiliation effects reflect social learning principles within these groups (Bandura, 1977) and that the personal R/S effects illustrate the influence of intrinsic religious motivations (Allport and Ross, 1967).

It is noteworthy, however, that two religious-affiliation types, Catholic and accommodating religions, were significant in the reverse direction (in the direction of risk). This finding is consistent with the authors' previous findings that differentiated religious-affiliation types (Haber and Jacob, 2007, 2009). It appears that affiliations that differentiate themselves from the majority culture's beliefs and values (including alcohol use norms) provide a protective effect regarding alcohol use, whereas affiliations that are more accommodating to the majority culture might not provide this protective effect and, instead, might convey a measure of risk.

Thus, a "broad-brush" approach to R/S variables may be inappropriate because, as seen here, different R/S attributes appear to have different impacts. In these data, personal R/S effects were consistently and inversely associated with all alcohol milestones. This suggests that personal R/S variables that assess an internal religiousness characteristic (i.e., high existential well-being, at least weekly attendance, and high motivation-devotion) are strong and consistent predictors of reduced alcohol risk. Applying this observation more generally, alcoholism treatment and recovery programs might find that internal motivations are strong determinants of behavior change and long-term outcomes. This view is consistent with Stages of Change theory (Prochaska et al., 1997) and is supported by recent work on the role of religion in mechanisms of change research (Neff and MacMaster, 2005a, 2005b).

It is important to note that affiliation effects ranged from protection to risk. In contrast to personal R/S, affiliation categories are an external, group-level characteristic that is more complex. For instance, Catholic and accommodating churches may be more open and tolerant than differentiating churches and, therefore, are more likely to include larger numbers of nominal (in name only) members who could have substantially higher rates of alcohol use. Such group composition could obscure personal religiousness effects. Affiliation findings, therefore, are difficult to interpret.

Given that both the risk factors and the R/S variables predicted alcohol milestones, albeit often in opposite directions, examination turned to relations between R/S variables and alcohol risk factors. As reported in the mental health and religion literature, there is an inverse association between R/S variables and depression, delinquency, suicide, family problems, and divorce (Koenig et al., 2001). Results were consistent and indicated that the personal R/S variables (motivation-devotion, religious attendance, and existential

well-being) were frequently and inversely associated with lower prevalence of clinical disorders (e.g., ODD, CD) and familial risk factors (e.g., parental inconsistency, parent-child arguments).

Once again, affiliation variables exhibited mixed results, and these results were also inconsistent with the above findings (affiliations exhibiting higher prevalence of alcohol milestones showed lower prevalence of risk factors, and vice versa). These inconsistencies ruled against the possibility that specific religious-affiliation effects might explain other relationships.

However, there was one exception. Those endorsing no religious affiliation were consistently and positively associated with every alcohol risk factor, and this was seen with every alcohol milestone. Thus, it can also be said that, although specific religious affiliation was not consistent, those who endorsed any religious affiliation had reliably lower rates of psychiatric and familial risk and lower prevalence at each alcohol milestone. These findings can be generalized and imply support for the general importance of R/S influences in clinical treatment and mutual-help programs.

In the context of many significant effects, it was important to identify risk factors and R/S variables that contributed most to the prediction of alcohol milestones. Results of multivariate analysis (modeling all variables simultaneously) demonstrated that R/S variables were not redundant with risk factors or with each other. Rather, after accounting for all other variables, R/S variables still contributed substantial unique variance to the prediction of the initial drink, first intoxication, regular use, and heavy use milestones; contributions to alcohol dependence were less. Further, observed R/S effects were of comparable size or larger than risk variable effects in many cases. Although minor changes may be seen in male samples, reasonable generality is expected in the overall pattern of these effects across gender. Thus, among the alcohol literature's most important predictors, R/S emerged as a substantial contributor to the prediction of alcohol outcomes.

Furthermore, it is noteworthy that one R/S variable (religious attendance) and two risk factors (CD and parental divorce/separation) were associated with all five alcohol use milestones, thus identifying unique but opposing influences that were consistent across all milestones. Other opposing (R/S vs. risk) influences were also evident at individual milestones. This evidence supported the contention that some R/S variables are as important as, but opposite to, the identified etiological risk factors in predicting alcohol milestones. (Note that this influence is less when predicting alcohol dependence.) These findings are consistent with the broader alcoholism-R/S literature that, in piecemeal fashion, has identified an inverse alcohol-R/S association for both male and female subjects at different points in the course of alcohol misuse (Heath et al., 1999; Koenig et al., 2001; Larson et al., 1998; Miller and Thoresen, 2003).

Thus, this profile of findings from young adult females appears to have illuminated the substantial contribution of personal R/S variables to the reduction of prevalence rates at five alcohol milestones. The findings expand our understanding of Jung's observation that "Spiritus contra spiritum," that is, that spirituality and alcoholic spirits oppose one another (Sandoz, 2001).

The final set of analyses addressed whether R/S variables influenced alcohol outcomes indirectly, that is, by mediating or moderating the influence of other factors such as the well-known alcohol risk factors. However, after conducting 360 univariate tests of mediation without finding any supportive evidence, mediation effects were dismissed. Even so, all mediation models affirmed the significance of the risk factor and the religion variable.

Similarly, after 360 tests of moderation, only 16 marginal findings emerged that would not pass a multiple-testing correction. Moderation effects were also dismissed. Even so, these moderation tests affirmed the significance of the two main effects, the risk factor and the religion variable. Taken together, these results strongly affirmed the independent (but often opposing) contributions of alcohol risk factors and R/S variables to the five alcohol milestones.

Limitations

It should be noted that this is a female sample and that modest gender differences have been identified with certain risk factors (Wilsnack, 1996) and with religion variables (Koenig et al., 2001). This would be expected to result in conservative estimates (because of lower alcohol outcome base rates) and somewhat greater sensitivity to R/S effects. However, these findings are robust, and after accounting for demographics and the major risk factors, R/S factors still contributed substantial unique variance to the prediction of each milestone. Although reasonable consistency across gender is expected, further testing is needed to determine generalizability to male samples and later age groups.

In addition, temporal relationships and direction of effects remain ambiguous in this cross-sectional data set and require further study. Methodologically, these results could also have been influenced by common method variance because most measures were derived from offspring reports. Finally, other mechanisms need to be examined regarding observed effects.

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