CORRELATES OF DRINKING AND SUBSTANCE USE AMONG OFFSPRING IN ALCOHOLIC FAMILIES: ADULT DAUGHTERS AND SONS

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In the United States, women exhibit fewer clinically significant alcohol problems than do men. For example, in 2001-2001, 12-month prevalence rates of DSM-IV Alcohol Dependence or Abuse (American Psychiatric Association, 2000) were considerably lower for females (4.87%) than for males (12.35%; Grant et al., 2004). Females also have a later age of onset, a more compressed course of symptom development, and a higher rate of physical complications (Bucholz et al., 1994b, Schuckit et al., 1998).

These differences raise the possibility that the antecedents of alcoholism for women and men may differ to some degree as well. The two genders share biological risk markers, such as reduced amplitude visual and auditory P3 (Suresh et al., 2003, Prabhu et al., 2001) and a diminished response to alcohol (Schuckit et al., 2003). In addition, heritability of alcohol problems is essentially the same for men and women (Heath et al., 1997), and specific genetic risk factors identified thus far, such as GABRG3 (Dick et al., 2004), are common to both genders. However, future investigations may reveal additional genetic and physiological antecedents of alcohol dependence that are sex-specific.

The same possibility applies to precursors that involve demography, family environment, child psychopathology, and parenting. The purpose of the present study was to examine whether predictors of drinking problems drawn from these domains are at all different for males and females. Multiple regression analyses were conducted on a national sample of men and women from high-risk families. Two established variables, externalizing symptoms (Kuperman et al., 2001) and religion (Wallace et al., 2004) were anticipated to predict drinking in both genders. Two other widely-known antecedents, demographic background and parental drinking, were expected to predict alcohol problems in a less evenhanded fashion; data from other investigations suggest that parental drinking might be more salient among females and that demographic factors might play a more significant role among males (Curran et al., 1999, Ohannessian et al., 2004). Finally, variables that address parenting and parent-child relationships separately for mother and father (e.g., mother consistency, father consistency) were anticipated to discriminate between male and female offspring in at least some instances, but the expected direction of differences was not clear.

METHOD

Sample

Subjects in the current study were drawn from the Collaborative Study on the Genetics of Alcoholism (COGA). For the present analysis, only high-risk families were included, ascertained through an alcohol-dependent proband in treatment and containing other first-

degree relatives with alcohol dependence. Methodological details of the COGA project can be found in Begleiter et al. (1995). Subjects missing data on any independent or dependent variable (see below) were excluded. The final sample consisted of 586 participants, of whom slightly more than half (54.9%) were female and a minority (10.6%) were probands. The two genders had similar age ranges and averages (women: mean = 38.7; range = 18 - 77; men: mean = 39.2; range = 18 - 78).

Assessment

All subjects were administered the Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA), developed for COGA. This instrument possesses adequate reliability and validity (Bucholz et al., 1994a, Hesselbrock et al., 1999) and assesses major DSM-IV psychiatric diagnoses, including alcohol dependence and abuse. In addition, the interview also queries the economic, religious, and familial characteristics of participants' childhoods.

Independent Variables

Potential predictors were selected from five domains. All retrospective variables were based on circumstances that prevailed when subjects were between 6 and 13 years of age. Demographic characteristics included age of participant at interview, whether he or she looked older than friends as an adolescent (Dick et al., 2000), size of town where the subject grew up, father's and mother's education, family's relative economic standing in the neighborhood (average, better off, worse off), whether the mother worked outside the home, and whether the father frequently was away from home (including reasons such as job, divorce, and separation). Family Environment variables included two religion questions (whether participant was raised in a fundamentalist denomination and whether his/her religion had rules against alcohol use); four-point scaled ratings of: (a) subject's relationship with mother and with father, (b) parents' relationship with each other, (c) conflict and tension in the home; dichotomous ratings of (a) whether parents frequently fought in front of the participant, and (b) whether the subject saw parents hit each other. Parenting predictors addressed, separately, mother and father strictness/laxity (3-point scales), consistency (Y/N), and punishment styles (primarily physical vs. nonphysical). Harsh physical punishment (from either mother or father) was assessed by asking participants whether they still hurt the next day and/or had to see a physician. Parental Pathology consisted of the maximum number of core alcohol symptoms (19 items) ascribed to the mother and to the father by other family members, using a validated family history interview (Rice et al., 1995). In addition, subjects were asked whether their mother or their father drank too much while they were growing up. Subject Pathology variables incorporated retrospective symptom counts drawn from two externalizing syndromes: Conduct Disorder (CD; 15 items) and Oppositional Defiant Disorder (ODD; 5 items; American Psychiatric Association, 2000).

Dependent Variables

Subjects' lifetime involvement with alcohol was measured in three ways: (a) whether subjects ever met criteria for DSM-IV Alcohol Dependence; (b) an alcohol problems symptom count that combined dependence and abuse criteria (12 items); and (c) the maximum number of drinks subjects had ever consumed in 24 hours. Two other

substance outcomes were tested as outcome variables: (a) the total number of drug categories ever tried (marijuana, cocaine, stimulants, sedatives, opiates, PCP, hallucinogens, and solvents); and (b) the typical number of cigarettes subjects consumed daily when smoking regularly.

Regression Analyses

Multiple regression was employed to control for correlations among the predictors. All analyses were conducted separately for males and females. Maximum drinks in 24 hours and average number of cigarettes per day were binned prior to analysis in order to make their distributions smoother. A stepwise variable selection procedure was employed, with significant predictors entered and nonsignificant ones removed at a $p<.05$ level. SAS binary logit was utilized for alcohol dependence, and cumulative logit was used for all other outcome variables (Allison, 2001).

RESULTS

For each outcome variable, predictors are listed in descending order of contribution to the final model. *Alcohol dependence* in females (16.8% of female sample) was positively predicted by their childhood CD symptom count. In addition, women who rated their mothers as too strict or too lax were significantly more likely to meet criteria for alcohol dependence than were women who rated their mothers as appropriately strict. With both predictors taken into account, 76% of women were correctly classified with respect to alcohol dependence. Males' alcohol dependence (35.6% of male sample) was positively associated with their CD symptom count, ODD symptom count, father being present in the home, parents fighting in front of subject, mother employing physical punishment, father having less education, and mother working at home. With all independent variables combined, 80% of males were correctly classified as being alcohol dependent or not.

Alcohol symptom count in women (mean = 2.1; range = 0 - 12) was positively predicted by retrospective CD and ODD symptom counts, looking older as a teenager, growing up in a smaller hometown, harsh physical punishment, being raised in a religion tolerant of alcohol, a poor relationship with the father, father drinking too much, and parents not fighting. Among men, the alcohol symptom count (mean = 3.6; range = 0 - 12) was positively associated with both CD and ODD symptoms, less father education, a religion that allowed alcohol, father's alcohol symptom count (attributed by others), and father being in the home. The maximum rescaled R^2, an approximation of variance accounted for, was higher for men (.34) than for women (.27).

Maximum drinks in 24 hours among females (mean = 11.6; range = 0 – 120; maximum rescaled R^2 = .17) was predicted by ODD symptoms (+), age (-), whether the subject experienced severe physical punishment (+), and a poor relationship with the father (+). Maximum drinks in males (mean = 22.1; range = 0 – 144; maximum rescaled R^2 = .28) was significantly associated with CD symptoms (+), religion that forbade alcohol (-), ODD symptoms (+), paternal education (-), and looking older as an adolescent (+).

The final model for *typical daily cigarette consumption* in women (mean = 8.4; range = 0 – 60; maximum rescaled R^2 = .08) contained three predictors: father drinking too much (+), father consistency in parenting (-), and severe physical punishment (+). For men (mean = 13.2; range = 0 – 90; maximum rescaled R^2 = .28), five variables emerged as significant predictors of cigarette use: age (+), poor relationship with the mother (+), CD symptoms (+), maternal consistency (+), and household conflict (+).

Finally, *number of drug categories tried* among females (mean = 1.6; range = 0 – 8; maximum rescaled R^2 = .17) was positively associated with CD symptoms, severe physical punishment, father inconsistency, and smaller town size. Among males (mean = 2.6; range = 0 – 8; maximum rescaled R^2 = .26), number of categories tried was positively predicted by CD and ODD symptom count as well as by more maternal education.

CONCLUSIONS

The current sample was drawn from densely affected alcohol-dependent families, with probands ascertained in treatment centers. For this reason, our subjects are not representative of all individuals from alcoholic families, and our results should be considered preliminary until they are replicated in independent investigations. In addition, significant associations between predictors and outcome variables do not imply causality. For example, severe physical punishment could be: a) a cause of daughter alcohol problems; b) a reaction to these problems; c) both cause and effect; or d) causally unrelated to such problems.

Certain predictors were shared by men and women: in both sexes, a history of externalizing symptoms (CD and/or ODD) positively predicted alcohol dependence, alcohol symptoms, maximum drinks, and number of drug categories tried. Looking older as an adolescent predicted alcohol use in females (symptom count) and males (maximum drinks). Religious sanctions against alcohol may have served as a protective factor, as it was associated with fewer alcohol symptoms in both genders and a lower number of maximum drinks in males. In addition to these shared predictors, several findings pointed towards differences between the sexes:

1. For each of the five outcome variables, predictors accounted for a smaller amount of the variation among women than among men.
2. When parenting and parent-child relationships emerged as predictors of offspring alcohol and substance involvement, they almost always (7 out of 8 instances) involved the opposite sex parent.
3. For women, but not men, severe physical punishment (seeing a doctor and/or hurting the next day) was a predictor of several outcomes (alcohol problems, maximum drinks in 24 hours, cigarette use, and number of drug categories tried). This variable may have served in some cases as a proxy for ongoing physical or sexual abuse.

4. There was no evidence for the hypothesis that, in females, parental drinking is more associated than SES is with substance outcome (each type of predictor emerged two times). There was limited support for the prediction that, among males, SES (as measured by mother and father education) was more associated with substance outcome (alcohol dependence, alcohol problems, and maximum drinks) than was parental drinking (father's alcohol symptom count), which only emerged as a predictor of alcohol symptoms .

It should be noted that counter-intuitive predictors of female alcohol problems (parents not fighting), male cigarette use (mother consistency), and male drug categories tried (more mother education) were only significant in the multiple regression models; simple (bivariate) correlations between these predictors and their respective outcomes were in all instances nonsignificant.

COGA is poised to begin a prospective investigation of high-risk adolescents and young adults in which subjects will be evaluated every two years. Besides information gathered from interviews and questionnaires, the investigation also will incorporate data from genetic, neurophysiological, neuropsychological, and community environment domains. We anticipate that this longitudinal approach will elucidate both common and gender-specific risk factors that signal the subsequent development of alcohol and drug problems.

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