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Evaluating Measures of Family History of Alcoholism: Density versus Dichotomy

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Abstract

Aims: Studies have used myriad measures of family history of alcoholism (FH) making it difficult to compare them directly. Commonly used FH measures partition samples into the well-known positive (FH+) and negative (FH-) dichotomy, although quantitative measures of density potentially provide more information. A standard FH measure would facilitate between-study comparisons. The purpose of this study is to evaluate a quantitative FH measure, called Family History Density (FHD), that has theoretical and practical advantages over currently used measures. *Design:* Logistic regression equations were estimated for FHD and six commonly used FH measures on alcohol dependence diagnosis and two measures of alcoholism severity (i.e., withdrawal and tolerance). *Participants:* Subjects recruited for studies (254 men and 97 women) completed a structured clinical assessment. *Measurements:* Alcoholism diagnosis and endorsement of tolerance or withdrawal symptoms were obtained using the alcohol module from the NIMH Diagnostic Interview Schedule III-R (DIS III-R). Family history of alcoholism was coded using the criteria from the Family Informant Schedule and Criteria (FISC). *Findings:* All FH measures were associated with alcohol dependence diagnosis, development of tolerance, and experiencing withdrawal symptoms in men. In women, only FHD and Parent were significantly associated with all three outcomes. *Conclusions:* FHD is a good candidate to be a standard FH measure because it is quantitative, based on familial relatedness, and capable of accounting for significant variation in alcoholism diagnosis and two indices of alcoholism severity in men and in women.

Introduction

Substantial evidence supports the long-held notion that alcoholism runs in families; however, while having a relative with alcoholism increases an individual's chances of developing alcoholism, it does not guarantee that outcome (Cotton, 1979). Alcoholism is much like other psychopathologies in that no simple Mendelian pattern of inheritance exists; it is a complex trait (Lander & Schork, 1994; Schuckit, 1994).

Family history of alcoholism (FH) has proved to be a robust index of risk for developing the disorder. Of course, FH measures do not provide a pure measure of genetic influence because, in a family, genes and family environment are confounded. Although such a caveat is likely to be found in every article written about FH measures, there is a tendency to think of FH measures as indices of "quasigenetic" effects (Alterman, 1988). We would like to emphasize that FH measures are better thought of as indices of "biopsychosocial" risk, explicitly recognizing that FH measures encompass a rich medley of intertwined vulnerability factors (see Zucker, 1987).

There is no FH measure that is generally accepted as the standard, although there has been interest in identifying one (Alterman, 1988; Turner et al., 1993). The studies listed in Table 1, found in a nonexhaustive search of the alcohol literature, report a variety of FH measures. Several of the measures partition samples into the well-known FH+ and FH- dichotomy, although a few (Degree, Lineal, FPA, and FEA) produce multiple categories or quantitative scores.

One of the most commonly used FH measures partitions on the basis of alcoholism in the father. For the measure Father, FH+ is defined as having a father with alcohol abuse or dependence and, in an effort to obtain groups of subjects that are at the extremes of risk, FH- is sometimes defined as having no first- or second-degree relative with alcohol abuse or dependence (e.g., Schuckit & Smith, 1996). Schuckit's group has shown that sons of alcoholics differ from those with no first- or second-degree alcoholic relatives on a variety of characteristics, most notably their level of reaction to alcohol (Schuckit & Smith, 1996). This partitioning, however, eliminates from study those individuals who do not have a father with alcoholism but do have other first- or second-degree relatives with alcoholism.

A measure that includes information on both parents (Parent) where having neither parent with alcoholism will be scored as FH-, thereby including subjects who were excluded with the measure Father. The definition of FH+ for Parent has not been consistent across studies. For example, FH+ has been defined as having at least one parent with alcoholism (e.g., Nirenberg et al., 1990; Rogosch, Chassin & Sher, 1990), or as having a father or mother in treatment for alcoholism (Ohannessian & Hesselbrock, 1995).

Table 1. Various measures of family history in the recent literature

Measure of family history	Studies
Father alcoholic	Schuckit & Smith, 1996; Schuckit, 1994; Sayette et al., 1994; Martin & Sher, 1994; Sher et al., 1991
Any 1st degree relative alcoholic	Drake et al., 1995; Wiesbeck et al., 1995; Schafer et al., 1991
Any blood relative alcoholic	Harford & Parker, 1994
Paternal or sibling plus 2nd degree relative alcoholic	Hesselbrock & Hesselbrock, 1992
Father alcoholic, but no alcohol problem on maternal side	Lex et al., 1994
Either parent alcoholic	Rogosch et al., 1990
At least one alcoholic parent	Nirenberg et al., 1990
Biological father OR sibling plus additional 2nd degree relative alcoholic	Gillen & Hesselbrock, 1992
At least one primary (mother, father, sibling) and one secondary (aunt, uncle, grandparent) or 3 secondary relatives alcoholic	Garland, Parsons & Nixon, 1993
Father OR mother in treatment for alcoholism	Ohannessian & Hesselbrock, 1995
Alcoholic father, paternal grandfather, and at least one other alcoholic male on paternal side	Finn & Pihl, 1987; Finn & Pihl, 1988; Conrod, Pihl & Ditto, 1995
Strong, moderate, weak Degree	Reed, Grant & Adams, 1987
Lineal	Harford, Parker & Grant, 1992; Harford, 1992; Dawson et al., 1992; Alterman, 1988
Family Patterns of Alcoholism (FPA)	Alterman et al., 1987; Hesselbrock, Hesselbrock & Stabenau, 1985; Stabenau, 1984
Family Expression of Alcoholism (FEA)	Turner et al., 1993
	Zucker et al., 1994

The measure First Degree is obtained by adding siblings to the Parent measure. For First Degree, FH+ is defined as having any first-degree relative (biological parent or sibling) with alcoholism. FH- for First Degree has been defined as having no first-degree relative with alcoholism (Schafer et al., 1991; Wiesbeck et al., 1995), or as having no first- or second-degree relatives with alcoholism (Drake et al., 1995). Father, Parent and First Degree are all dichotomous FH measures.

Degree, based on Alterman's (1988) four-category Generational Classification, extends First Degree to include information on second-degree relatives for FH+. The four categories have been defined by Dawson, Harford & Grant (1992) as follows: FHN = no biological relatives reported as problem drinkers or alcoholics, FHP1 = alcoholism reported only in second- or third-degree relatives, FHP2 = alcoholism reported only in first-degree relatives, FHP3 = alcoholism reported in both first- and second- or third-degree biological relatives.

Alterman et al., (1987) used a measure, called Lineality, that indicated the number of sides of the family that contained relatives with alcoholism. Lineality is a three-category measure with (1) nonlinear = no history of alcoholism in parents or grandparents, (2) unilineal = with alcoholism reported in parents or grandparents from only one side of the family, and (3) bilineal = with alcoholism reported in parents or grandparents on both sides of the family.

Turner et al. (1993) introduced family pattern of alcoholism (FPA) analysis where each family member (grandparents, parents, aunts, uncles, brothers, sisters, sons, and daughters) was rated as either (1) an abstainer, (2) a nonproblem drinker, or (3) a problem drinker. Parents and grandparents were given a score of 1 if they were rated as a problem drinker and a score of 0 otherwise. To control for number of aunts, uncles, and siblings for each category, the proportion of problem drinkers to the total membership in that category is calculated. FPA is a quantitative measure consisting of the sum of scores of all reported relatives.

Turner et al. (1993) compared FPA to several measures of family history in the literature and found that FPA explained more variance in age of onset of alcoholism, consequences of drinking and alcoholism severity in male veteran inpatients than did any of the other measures. Clearly, this study suggests the value of moving away from a multitude of family history measures toward a standard that is quantitative and therefore amenable to more sophisticated statistical analysis.

Heterogeneity in FH measures makes it difficult to compare studies, although indexing vulnerability to alcoholism appears to be effective with any of these measures. This review was not intended to be exhaustive but to illustrate the diversity of FH measures in the literature. Adopting a standard FH measure would facilitate comparisons between studies.

We propose a new FH measure called Family History Density (FHD) that is essentially a modification of FPA, with a weighting scheme based on familial relatedness (Zucker, Ellis & Fitzgerald 1994). The present study evaluates the performance of FHD and that of various other FH measures on the capacity to predict measures of alcohol dependence (alcoholism diagnosis; development of tolerance and experience of withdrawal symptoms) in both men and women. These analyses include FH measures that represent those commonly found in the alcohol literature chosen to reflect various levels of information content. We hypothesize that FHD will be associated with measures of alcohol dependence in both men and women.

Methods

Subjects

The study sample was obtained from a comprehensive database of 1,583 individuals who were recruited from community (41%), alcoholism treatment (49%), and medical hospital (10%) settings for a variety of research studies at the University of Michigan Alcohol Research Center (UMARC) during 1989–95. Individuals from the community included those with and without a history of alcohol problems. Study participants from the alcoholism treatment and medical hospital settings included individuals with a history of alcohol problems with or without other drug-use problems. After a brief screening interview, those who consented and were eligible for further studies were given the structured diagnostic interview analyzed herein. Patients from alcohol treatment centers were initially screened via chart review, which generally excluded subjects known to have psychiatric disorders that required treatment with medication, such as schizophrenia or manic depression. Participants resemble local county residents in education, race, and marital status (see

Hill et al., 1997 for a more detailed description of sample characteristics and recruitment methods).

Only those who provided alcohol problem data on each of their six direct biological ancestors (mother, father, all four grandparents) were included in the study sample ($n = 351$). Most subjects with missing values responded "Don't know" about the drinking history of one or more relatives, possibly due to their lack of exposure to those relatives. An approach to include more subjects would be to score a "Don't know" as nonalcoholic, however, to maximize the accuracy of the family history measures, we avoided inclusion of subjects with missing family history information.

Those in the study sample were not significantly different from the complete UMARC sample on the primary measures of interest for this study: mean number of alcohol symptoms, lifetime development of tolerance or experiencing withdrawal, or age of alcoholism onset (data not shown), with one exception. The subsample of women had slightly fewer mean alcohol dependence symptoms ([mean \pm SD] 2.86 ± 3.19) than did the complete sample (3.04 ± 3.27), $t(517) = 2.17$, $p < 0.05$.

Measures of subject characteristics

Alcohol abuse or dependence diagnosis was made by using the alcohol module from the NIMH Diagnostic Interview Schedule III-R (DIS III-R) (Robins et al., 1981). The DIS III-R assesses symptomatology based on the DSM-III-R, allowing for individual symptom counts and dates of earliest and most recent occurrence of individual symptoms. Lifetime development of tolerance was assessed by endorsement of the question "Did you ever get tolerant to alcohol, that is you needed to drink a lot more in order to get an effect, or found that you could no longer get high on the amount you used to drink?" Lifetime experience of withdrawal symptoms was assessed by endorsement of the question "People who cut down or stop drinking after drinking for a considerable time often have withdrawal symptoms. Common ones are the 'shakes' (hands tremble), being unable to sleep, feeling anxious or depressed, sweating, heart beating fast or the DTs or seeing or hearing things that aren't really there. Have you had any problems like that when you stopped or cut down on drinking?" Tolerance and withdrawal were selected for analysis because they represent diagnostically important measures of alcoholism severity. All demographic data except for occupational prestige were determined using the DIS III-R. Occupational socioeconomic status (i.e., occupational prestige) ratings were based on the indexes for MSE12 census occupational categories (Featherman & Stevens, 1982).

Family history measures

Family history of alcoholism was assessed during interviews with the participant. A pedigree was constructed, showing children, parents, siblings, aunts, uncles, and grandparents. For each relative, level of alcohol use was assigned (abstinent, social drinker, and probable or definite alcoholism). Alcoholism was coded using the criteria from the Family Informant Schedule and Criteria (FISC, Mannuzza et al., 1985). Probable alcoholism was coded when the respondent could give examples of the relative being frequently drunk, drinking regularly, and heavily, or "always had a glass in his hand." Definite was coded if the respondent could also name specific consequences from the FISC list (legal, marital,

work, or health problems, fights when drunk, or alcoholism treatment). In the present analysis “probable” and “definite” codes were collapsed. Hill et al. (1994) analyzed the roles of several traditional FH measures on alcohol consumption and dependence in a partially overlapping sample of UMARC participants. We chose to evaluate FHD relative to six FH measures that have been used in previous research. Based on these self-report data, we assigned each subject a score for each of the following family history measures:

- a) *Father*: Dichotomous variable assessing whether the subject has an alcoholic father (0 = no first- or second-degree alcoholic relatives; 1 = alcoholic father).
- b) *Parent*: Dichotomous variable assessing whether the subject has any parent with alcoholism (0 = neither parent alcoholic; 1 = alcoholic father, mother, or both).
- c) *First degree*: Dichotomous variable indicating whether the subject had any alcoholic first-degree relatives (0 = no alcoholic parents or siblings; 1 = one or more alcoholic parents or siblings).
- d) *Lineal*: A three-level variable indicating the number of sides of the family in which there is a history of alcoholism (0 = none, 1 = paternal or maternal; 2 = paternal and maternal).
- e) *Degree*: A four-level variable indicating density of familial alcoholism (0 = no alcoholic first- or second-degree relatives; 1 = only second-degree alcoholic relatives; 2 = only first-degree alcoholic relatives; 3 = both first- and second-degree alcoholic relatives).
- f) *Family pattern analysis (FPA)*: FPA score was calculated as in Turner et al., (1993) where alcoholic parents and grandparents were each given a score of 1 and nonalcoholic parents and grandparents were each given scores of 0. Scores for aunts, uncles, and siblings were the percentages of alcoholics in each sibship. For each subject, FPA scores were summed across relatives. In the present analyses FPA scores ranged from 0 to 9.67.
- g) *Family history density (FHD)*: FHD score was based on degree of relatedness where both parents (each = 0.5) and all four grandparents (each = 0.25) were considered (see Zucker et al., 1994). Nonalcoholic relatives were given a score of 0, alcoholic relatives were given a score based on their relatedness (e.g., alcoholic father = 0.5; alcoholic grandmother = 0.25). Those scores were summed over the six direct ancestors to obtain FHD scores that range from 0 to 2.

Statistical analysis

Logistic regression equations were estimated, separately by gender, for each of the FH measures on: (1) DSM-III-R lifetime diagnosis of alcoholism, defined as alcohol dependence or abuse; DSM-III-R symptom of (2) tolerance and (3) withdrawal. Men and women were analyzed separately. Logistic, rather than general linear, regression was employed because the dependent variables were either ordinal but not normally distributed (alcoholism diagnosis) or dichotomous (tolerance and withdrawal). Alcoholism diagnosis for each subject was analyzed as follows: 1 = no alcohol abuse/dependence, 2 = alcohol abuse only, 3 = mild alcohol dependence, 4 = moderate alcohol dependence, 5 = severe alcohol dependence (Robins et al., 1981). For both tolerance and withdrawal, if the subject reported experiencing the symptom in their lifetime, they were given a score of 1; if not, they were

given a score of 2. Table 2 presents the frequency distributions and percentages of men and women across the three outcome categories.

Table 2. Frequency distributions and percentages of categorical outcomes for males and females (see text for category descriptions)

Alcoholism diagnosis	Males (<i>n</i> = 254)		Females (<i>n</i> = 97)	
	Frequency	%	Frequency	%
1	93	36.6	55	56.7
2	3	1.2	3	3.1
3	6	2.4	4	4.1
4	50	19.7	16	16.5
5	102	40.2	19	19.6
Tolerance ^a	126	50.8	32	36.0
Withdrawal ^a	110	44.4	23	25.8

^aPercentage of lifetime symptom endorsement

Models were judged on whether their standardized regression coefficients were significantly different from zero. Results of the various models were not directly compared with each other because the predictors were highly correlated. For descriptive purposes, goodness-of-fit was judged using the area under the receiver operating characteristic (ROC) curve. ROC curves are created by plotting sensitivity (accuracy for predicting events), versus one minus specificity (accuracy for predicting nonevents). The greater the area under the ROC curve (values can range from 0.5 to 1.0), the better the explanatory power of the logistic regression model (see Hanley & McNeil, 1982).

Results

Mean age for the men (*n* = 254) was 49.4 (\pm 15.7). For the 97 women, the mean age was 51.1 (\pm 17.6). The majority of the sample was Caucasian (91.5% men, 95.8% women). Subjects were recruited from a variety of settings with men and women differing in recruitment source ($\chi^2 = 13.9$, 2 df, $p < 0.001$). Significantly more men (45%) than women (23%) came from alcoholism treatment settings, while more women (62%) than men (45%) came from community settings. There were no gender differences in the number of subjects coming from medical hospital settings (8% men, 13% women).

Despite these differences in subject source, there were no gender differences in marital status (83.5% ever married for men, 82.3% for women, $Z = 0.3$, NS), or in mean occupational prestige ratings (43.4 \pm 23.5 for men, 46.9 \pm 17.6 for women, $t(230) = 1.50$, $p = 0.13$), although women had higher average educational levels than men (14.9 \pm 2.1 years of education and 14.2 \pm 2.5, respectively, $t(340) = 2.63$, $p = 0.009$).

In the study sample, men were diagnosed more frequently than women as having either alcohol abuse or dependence (63.4% and 43.3%, respectively, see Table 2), and more men than women reported developing tolerance (50.8% and 36.0%, respectively) and experiencing withdrawal symptoms (44.4% and 25.8%) at some time in their lives. These gender differences are consistent with the fact that more men than women in this sample were

recruited from treatment sources, and with previously observed gender differences in the prevalence of alcoholism (e.g., Kessler et al., 1994).

Alcoholism diagnosis

In Table 3, FH measures are sorted in descending order based on their relative information content. That is, those measures that are quantitative or multicategorical are listed above dichotomous measures. Table 3 contains the area under the ROC curve and the standardized parameter estimates for the ordinal logistic regressions of FH measures on alcoholism diagnosis. For males, all standardized beta weights are significantly different from zero. FPA (69.0%) and Father (68.6%) appear to be the most robust predictors of alcohol dependence diagnosis in men, followed by Degree (65.4%), Lineal (63.8%), FHD (63.3%), First Degree (60.5%), and Parent (58.3%).

Table 3. Goodness of fit of logistic regression models for measures of family history of alcoholism

	Alcohol dependence diagnosis		Tolerance		Withdrawal	
	Area under curve ^a	Parameter estimate	Area under curve	Parameter estimate	Area under curve	Parameter estimate
Males	(N = 254)		(N = 248)		(N = 248)	
FPA	69.0	0.45†	62.7	0.24†	71.8	0.47†
FHD	63.3	0.31†	58.7	0.16*	65.6	0.34†
Degree	65.4	0.36†	60.6	0.20†	67.5	0.36†
Lineal	63.8	0.34†	59.0	0.19†	63.9	0.30†
First degree	60.5	0.27†	56.6	0.15*	63.0	0.30†
Parent	58.3	0.23†	56.0	0.15*	59.9	0.24†
Father	68.6	0.52†	63.8	0.32†	72.1	0.56†
Females	(N = 97)		(N = 89)		(N = 89)	
FPA	60.5	0.28†	60.6	0.19	66.3	0.31*
FHD	64.1	0.34†	65.1	0.30*	65.6	0.26*
Degree	56.5	0.15	60.4	0.22	62.5	0.26
Lineal	56.0	0.14	53.9	0.08	55.7	0.12
First degree	57.7	0.20	63.0	0.29*	62.3	0.27*
Parent	61.5	0.34†	63.3	0.34†	66.3	0.39*
Father	57.4	0.20	60.6	0.24	61.7	0.27

^aReceiver operating characteristic. * $p < 0.05$, † $p < 0.01$, ‡ $p < 0.001$

In females, FHD, Parent, and FPA are associated with alcoholism diagnosis as shown by statistically significant standardized beta weights. FHD accounts for the largest area under the ROC curve (64.1%) followed by Parent (61.5%) and FPA (60.5%). None of the other FH measures are significantly associated with alcoholism diagnosis in women.

Tolerance

Table 3 presents the area under the ROC curves and standardized beta weights for the logistic regressions of FH measures on development of tolerance for males and for females.

For males, all FH measures are significantly associated with development of tolerance. Father (63.8%) and FPA (62.7%) appear to be the strongest predictors of tolerance in men, followed by Degree (60.6%), Lineal (59.0%), FHD (58.7%), First Degree (56.6%), and Parent (56.0%).

For females FHD, Parent, and First Degree are significantly associated with development of tolerance explaining 65.1%, 63.3%, and 63.0% of the area under the ROC curve, respectively. None of the other FH measures are significantly associated with the development of tolerance in our sample of women.

Withdrawal

Table 3 presents the area under the ROC curves and the standardized beta weights for the logistic regressions of FH measures on lifetime experience of withdrawal symptoms for males and for females. All FH measures have significant standardized parameter estimates for males. Father (72.1%) and FPA (71.8%) appear to be the best predictors of withdrawal in men closely followed by Degree (67.5%), Lineal (63.9%), FHD (65.6%), First Degree (63.0%), and Parent (59.9%).

For females, FPA and Parent both accounted for 66.3% of the area under the ROC curve, while FHD accounted for 65.6% and First Degree 62.3%. None of the other FH measures were associated with withdrawal in women.

Discussion

In this study all seven FH measures were significantly associated with alcoholism diagnosis, development of tolerance, and experience of withdrawal in men. In women only FHD and Parent were significantly associated with all three outcome measures. Because of the theoretical advantages of FHD, these results suggest that it should be considered when selecting an FH measure, especially when both men and women are to be studied.

Because FH is a robust index of vulnerability for alcoholism and because many studies have a family history component, there has been interest in developing a standard FH measure. Alterman (1988) found the Lineal classification to be an advance over dichotomous FH measures. Turner et al. (1993) reported that Family Patterns of Alcoholism (FPA) explained more variance in consequences, dependence, and age of onset of alcoholism than did dichotomous FH measures. In the present analyses (as in Turner et al., 1993), FPA outperforms Lineal in men. In the present study, FPA outperformed Lineal in women, although neither Alterman (1988) nor Turner et al. (1993) studied women. FPA appears to be a real advance in the measurement of FH.

Although FHD is based on FPA, there are two subtle, but important, differences between them. First, FHD uses information from only parents and grandparents, i.e., direct ancestors, whereas FPA uses information about many relatives including aunts, uncles, and siblings. By not including information from aunts and uncles to calculate FHD, even though they are as genetically informative as grandparents, we are underscoring the position that FH measures are not measures of genetic risk but of biopsychosocial risk. In this context, grandparents are not interchangeable with aunts and uncles because grandparents have greater potential influence. Grandparents establish and maintain the rearing

conditions of parents, aunts, and uncles. Therefore, grandparents have a more direct path of influence than do aunts and uncles. In fact, some of the influence of aunts and uncles on the proband may be thought of as being indirect effects of the grandparents mediated through the aunts and uncles. A similar argument can be made for sibling and parental effects. Secondly, the weighting system for FHD is based on familial relatedness, whereas FPA uses arbitrary dummy codes (0,1) and percentages. Weighting by familial relatedness is functionally the same as weighting by genetic relatedness (i.e., parents = 0.50, grandparents = 0.25) but is theoretically distinct because it explicitly takes into account hypothesized influence of family environment. That is, in general parents can be expected to have more direct influence than grandparents (although some of the parental effect can also be thought of as indirect influence of grandparents).

By including mothers in the scoring of FHD, we risk confounding effects on our outcome variables with deleterious effects associated with drinking during pregnancy including, but not limited to, fetal alcohol syndrome (FAS). Because FH measures, such as FHD, are indices of biopsychosocial risk in the fullest sense, the deleterious effects of drinking during pregnancy should be included. Only if one considers FH to be an index of genetic effects should mothers not be included. However, failing to consider the effects of drinking during pregnancy may result in a biased assessment of biopsychosocial risk.

One limitation of this study involves the use of self-report accounts to measure family history of alcoholism. When compared to family history diagnosis of other psychiatric disorders, self-reports of family history of alcoholism appear to be less biased and relatively reliable (Adrean et al., 1986). Probands with a history of major depression or generalized anxiety tend to overreport the same diagnosis in their parents (Kendler et al., 1991); however, the existence of this bias has not been strongly supported for alcoholism (Dawson et al., 1992; Crum & Harris, 1996). It appears that family history of alcoholism data is adequately reliable and not overly prone to bias. Another limitation of this study is that we were unable to directly compare the FH measures statistically. Given the large sample sizes required to have sufficient statistical power to detect small differences in the area under the ROC curve (Hanley & McNeil, 1982), we use these areas for descriptive purposes only. A one-tailed test ($\alpha = 0.05$) for the difference between 70% and 75% would require 652 subjects per group to have 80% power. The generalizability of FHD to other countries and cultures is not obvious. Certainly, transmission of genetic material from grandparents to parents to proband does not vary, but familial patterns of social transmission are less stable across cultures. Multicategory or continuously varying measures confer statistical advantages over dichotomous measures that are culture-free; therefore, the results of the present study are generalizable in that respect.

Our results do not indicate that FHD represents a great improvement in the assessment of biopsychosocial vulnerability to alcoholism over other methods of measuring FH in males. In fact, the dichotomous measure Father outperformed all other FH measures in males. The measure Father, however, has two drawbacks: (1) it is dichotomous, and (2) its strict definition of FH (no first- or second-degree relatives with alcoholism) eliminates many potential subjects from analysis. In studies designed to compare high and low risk men, Father appears to be a very good measure. However, our results suggest that Father is not a good measure of risk in women. Clearly, study design should inform choice of FH

measure. However, it should be noted that while an index of risk similar to Father can be derived from FHD scores (low FHD = 0; high FHD ≥ 0.75), one cannot derive FHD scores from Father. Parent performed surprisingly well in both men and women. However, it too is a dichotomous measure and is less commonly used than Father. In studies designed to use FH as a covariate in modeling, quantitative, multigenerational (Finn & Pihl, 1988) measures such as FPA or FHD would be preferable. When women are considered, our results indicate that FHD would be a better choice than FPA. Future research could evaluate whether FHD is as effective as Father at classifying at-risk individuals. Because self-report of family history of alcoholism appears to be relatively reliable (Andreason et al., 1986), future work could include the development of a self-report instrument to assess FHD. Although direct personal interview is the ideal method of collecting family history data, it is not always possible. A self-report questionnaire designed to assess FHD could facilitate the use of FHD as a standard FH measure.

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