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Spouse similarity for lifetime psychiatric history in the general population

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ABSTRACT

Background. Most studies of spouse similarity for psychiatric disorders have focused on clinical samples and are thus limited by selection bias. This study is, to our knowledge, the first comprehensive investigation of spouse similarity for lifetime psychiatric history in a general population sample using standardized diagnostic criteria.

Methods. We studied 519 pairs of spouses residing in Edmonton, Canada who completed the Diagnostic Interview Schedule psychiatric interview. In each pair, one spouse belonged to a random subsample of persons who had participated in a large population survey and was re-interviewed. Association between spouses for lifetime DSM-III psychiatric disorders was analysed with bivariate and multivariate logistic regression analyses.

Results. We observed significant spousal association for lifetime presence of affective disorders and for the spectrum of antisocial personality and addiction disorders. Antisocial personality in one spouse was also associated with anxiety disorders in the other spouse, namely post-traumatic stress disorder in wives and phobia in husbands; similarly, drug abuse/dependence in wives was associated with generalized anxiety in husbands and male drug abuse/dependence was associated with female post-traumatic stress disorder. Dysthymia in wives was associated with generalized anxiety and post-traumatic stress disorder in husbands.

Conclusions. The existence of associations between spouses for the presence of psychiatric disorders, either similar or different, has significant implications for both clinicians and researchers. Future research should aim at exploring the aetiological mechanisms of these associations.

INTRODUCTION

The phenomenon of spouse similarity – the tendency for couples to be more similar for a phenotypic trait than would be expected if pairs were chosen at random – has interested researchers in a variety of fields. In psychiatry, the study of spouse similarity for psychiatric illness has potential implications at the scientific level, where the existence of assortative mating, the selection of mates for particular phenotypes (Eckland, 1972), would be important for genetic and familial studies; at the clinical level, the presence of spouse similarity for psychiatric illness may affect outcome of psychiatric treatment, course and outcome of marital therapy, and the family environment and risk of psychiatric illness developing in offspring (Merikangas, 1982). Detection of significant spouse similarity for a given psychiatric illness does not necessarily imply the existence of assortative mating. Similarity could be alternatively explained by the illness of one partner influencing ('infecting') the other or mutual breakdown resulting from a common source (e.g. life events, marital conflict) (Nielsen, 1964).

The occurrence of spouse similarity for psychiatric disorders has been examined in numerous studies over the past 30 years (Merikangas, 1982; Galbaud du Fort *et al.* 1994); most used

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clinical samples, in which one or both spouses were receiving psychiatric treatment. The majority of these studies reported a significant association between the psychiatric status of spouses. Regardless of the study methods, all studies conducted on clinical samples are subject to selection bias arising from two sources (Galbaud du Fort *et al*. 1993). First, the probability of a couple being drawn for a clinical sample depends on whether one or both spouses have the illness in question, being greater for couples in which both spouses are sick. This is similar to the case of family genetic studies, where the probability of a family being drawn, under incomplete ascertainment, depends on the number of members with the disorder (Elandt-Johnson, 1971). Secondly, the probability of a person seeking treatment is, in all likelihood, not independent of that of his or her spouse. The few authors who have discussed this question all concluded that, for couples in which both partners suffer from psychiatric illness, it is easier for the second spouse to seek treatment if one spouse has done so (Kreitman, 1962; Nielsen, 1964; Hall *et al*. 1971). A parallel can be drawn with the observation made by Kendler (1995) that, in a sample of female twins with a lifetime history of major depression, the probability of treatment seeking for major depression was significantly increased by the presence of one or more relatives with a lifetime history of major depression who had an earlier onset and who had themselves sought treatment for their depression.

Thus, dually-affected couples are over-represented in clinical samples and spouse similarity for psychiatric illness is difficult to interpret in such samples. Several studies of spouse similarity for psychiatric morbidity have been conducted in the general population, but only two of these used standardized diagnostic criteria to define psychiatric cases (McLeod, 1993; Schuckit *et al*. 1994) and were limited to the study of spouse similarity for alcohol dependence. In another study, an overall psychiatric caseness was based on judgement by a psychiatrist (Hagnell & Kreitman, 1974). Two older studies used a composite definition, with cases being defined as subjects with a high score on the psychiatric subscale of the Cornell Medical Index or those noted to have presented with definite neurotic symptoms in the general practitioner records (Ryle & Hamilton, 1962; Pond *et al*. 1963). Most of the other population studies used symptom rating scales: subscales or instruments derived from the Hopkins Symptom Check List SCL-90 (Tambs, 1991; Galbaud du Fort *et al*. 1994; Kendler *et al*. 1994); Short Michigan Alcoholism Screening Test (Gleiberman *et al*. 1992); General Health Questionnaire and Leeds General Scales for the Self-Assessment of Depression and Anxiety (Eagles *et al*. 1987); and the Neuroticism subscale of the Maudsley Personality Inventory (Hare & Shaw, 1965). Consequently, the study presented here is, to our knowledge, the first comprehensive investigation of spouse similarity for lifetime psychiatric history using standardized diagnostic criteria in a general population sample.

METHOD

Data collection

The spouse data are part of the Family Study of Mental Disorders conducted in Edmonton, Canada, which arose from an earlier general population survey. The Family Study was designed to address familial aggregation of mental disorders; we used the spouse data to carry out secondary analysis. Fig. 1 presents a flow chart that describes the selection of subjects for our study. Briefly, a random sample of 3956 adult residents, generated with two-stage sampling from a list of city residences, was administered the Diagnostic Interview Schedule (DIS) version III between December 1984 and February 1989. These methods are described elsewhere for an identical, earlier study (Orn *et al*. 1988). Next, contact was made with 2482 of these persons to ask for a second interview. To investigate incidence of psychiatric disorders, a subsample of 1964 subjects was re-interviewed with the DIS version IIIa an average of 2·8 years later (median 2·6; minimum 1·5; maximum 6·0), representing a response rate of 85·8% (number of persons re-interviewed divided by the number of persons re-interviewed plus refused).

Altogether 35·6% of those in the re-interview sample and 34·3% of those who were not re-interviewed had a lifetime DSM-III psychiatric history, compared with 34·5% of those in the original sample of 3956 persons. The sex distribution, as well as the lifetime prevalence of

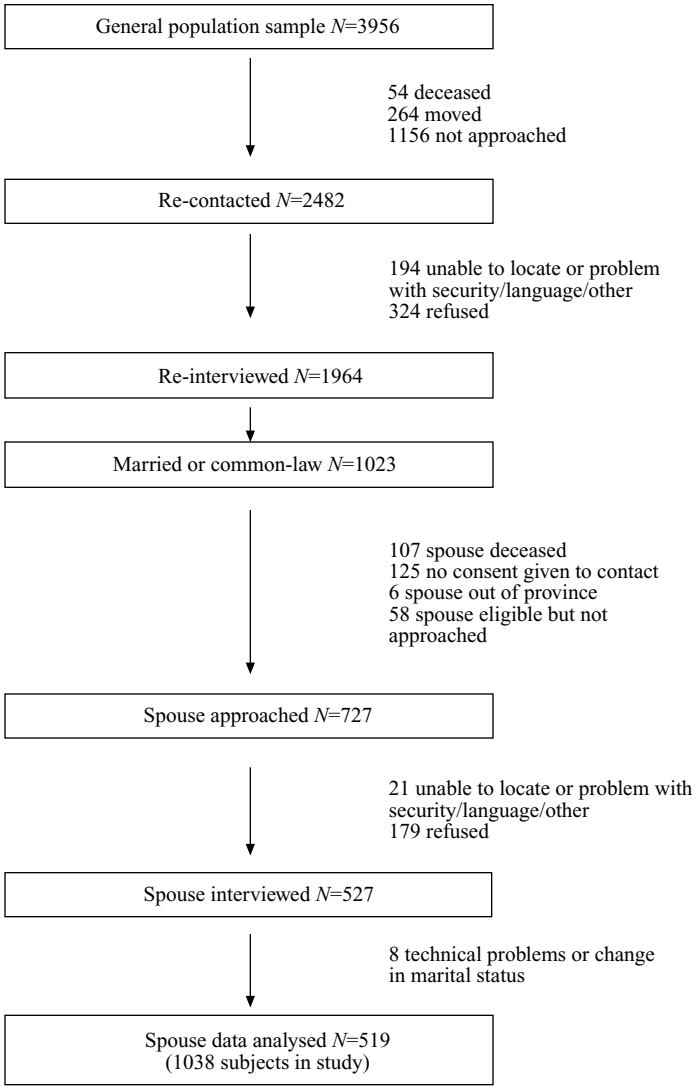

FIG. 1. Flow chart of selection of subjects for present study.

various mental disorders, were similar in the re-interview sample and the original sample, and were comparable to those observed in the Epidemiologic Catchment Area study, as was the case for the identical, earlier study in Edmonton (Bland *et al.* 1988, 1994). The subsample contained a smaller proportion of respondents 18 to 29 years-old (26·9 *v.* 34·7%) and a relative excess of persons older than 45 years (40·4 *v.* 33·2%).

For the Family Study, the first-degree relatives and spouses of the re-interviewed subjects were enumerated, and consent to contact living family members was sought from the re-interviewed subjects. In total, 1023 spouses were enumerated of whom 785 were eligible (non-eligible spouses were those who were deceased, were located outside of the province, or those for whom Family Study consent was not obtained). Fifty-eight eligible spouses could not be approached due to time and resource restraints; a total of 727 eligible spouses were approached for interview (37·3% of these were spouses of subjects with a lifetime psychiatric history). A small

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number (21) of eligible spouses were not interviewed because they could not be located for interview or because of security, language or other problems.

Interviews with the DIS instrument (version IIIa) were completed for 527 spouses, representing a response rate of 74·6%, up to 1 year after the re-interview stage. Thirty-eight per cent of those interviewed were spouses of re-interview subjects with a lifetime psychiatric history, *versus* 35·2% of the spouses who refused to be interviewed. Eight couples were excluded from our secondary analysis due to technical problems or changes in marital status between the time of the re-interview and spouse interview; data were thus available for a total of 519 couples (1038 persons). For those subjects who were part of the re-interview sample, their re-interview data were used. 'Spouses' were defined as marital partners or heterosexual couples cohabiting as though married; couples that were separated at the time of interview for reasons other than job location were not included. The data in the present study were limited to that collected by the DIS instrument; we thus did not have information about age when marriage or cohabitation began or length of cohabitation.

Instrument

The DIS psychiatric questionnaire used in this study is a structured interview, administered by a non-clinician interviewer, which elicits information about psychiatric symptoms at the time of the interview and in the lifetime of the respondent (Robins *et al*. 1981, 1985). A computer program was used with our DIS data to produce lifetime diagnoses of psychiatric disorders according to DSM-III criteria, including severity but not exclusion criteria. To reduce dilution of significant associations and to simplify the analysis, disorders with a very low lifetime prevalence, i.e. less than 3% in each gender, were excluded; these included obsessive–compulsive, somatization disorder, anorexia, bulimia, schizophrenia and cognitive impairment. There were no couples concordant for any of the excluded diagnoses. The disorders analysed included manic episode, major depression, dysthymia, phobia, panic, generalized anxiety, post-traumatic stress disorder (PTSD), alcohol abuse or dependence, drug abuse or dependence and antisocial personality. Because of the low sensitivity of the DIS/DSM-III definition of somatization disorder, we also looked at the association between spouses for a diagnosis of 'somatization syndrome', which was defined as four or more DIS symptoms of somatization disorder with onset before 30 years of age for males, and six or more symptoms for females with the same age at onset restriction (Swartz *et al*. 1991). A diagnosis of 'any' lifetime disorder was given if the subject had any one of the disorders analysed (for antisocial personality, severity criteria were excluded). Counts of symptoms were examined for each disorder except dysthymia, since these symptoms were included in the counts for major depression or somatization.

Prevalence of disorders in the study sample

Table 1 displays the lifetime prevalence of the psychiatric disorders examined in our study and mean age for the 2328 persons (64·9% female) married or cohabiting as if married in the general population sample of 3956 persons, compared to the 1038 persons (50% female) in our study sample. Several disorders were more frequent in our sample (mania, major depression, dysthymia, panic and drug abuse/dependence in females, generalized anxiety and somatization syndrome in males and phobia in both genders); however, in both genders the prevalence of overall psychiatric morbidity (presence of 'any' disorder) did not differ significantly. Mean age in both genders was significantly greater in our sample by 3–4 years.

Statistical analyses

The association between spouses for the lifetime diagnosis of each disorder and of 'any' disorder was studied with the calculation of odds ratios from 2×2 contingency tables. Each cell in the 2×2 table contained a count of the number of couples for whom either: (1) both spouses had a diagnosis or both did not (concordant couples); or (2) one spouse had a diagnosis and the other did not (discordant couples). In a 2×2 table, the odds ratio is a measure of concordance/discordance since concordance is a synonym for positive association as attested by an odds ratio significantly greater than 1; likewise, discordance is a synonym for negative association as attested by an odds ratio significantly less than 1. Spouse similarity for number of symptoms was

Table 1. *Lifetime prevalence of psychiatric disorders by gender in general population and study samples (for persons married or living together as married)*

	Prevalence (number of cases per 100)			
	General population sample		Study sample	
	Males ($N = 818$)	Females ($N = 1510$)	Males ($N = 519$)	Females ($N = 519$)
Psychiatric disorder				
Manic episode	0·4	0·4	1·0	1·2*
Major depression	7·0	13·9	8·9	20·5***
Dysthymia	2·7	5·2	3·5	8·9**
Phobia	2·4	6·2	6·2***	12·3***
Panic	1·1	2·6	0·8	4·4*
Generalized anxiety	10·5	19·3	15·8**	17·5
Somatization syndrome	0·7	3·6	2·1*	4·6
PTSD	0·8	3·5	1·2	3·3
Alcohol abuse/dependence	30·4	6·8	33·5	8·2
Drug abuse/dependence	3·7	2·3	4·8	4·2*
Antisocial personality	6·2	1·1	6·6	1·4
Antisocial personality†	13·7	4·3	13·9	3·5
Any of the above disorders	48·2	42·7	47·7	40·2
Age (mean ± S.D.)	43·0 ± 15·6	39·2 ± 13·9	46·1 ± 14·3***	43·4 ± 13·8***

* $P < 0{\cdot}05$; ** $P < 0{\cdot}01$; *** $P < 0{\cdot}001$.
† Without severity criteria.

examined with non-parametric Kendall tau-B correlations since the distribution of most symptom counts deviated from normal. A P value of less than 0·05 was used to indicate a statistically significant result in the cross-tabulations and correlation analyses.

We used multivariate logistic regression analysis to identify the strongest associations of disorders between spouses while taking into account the possible confounding role of co-morbid disorders in the subject's spouse. Specifically, for each diagnosis in wives logistic regression was used to determine the independent contribution of psychiatric diagnoses in the husband (the independent variables) to the wife's diagnosis (the dependent variable), considering all disorders in the husband associated with the wife's diagnosis at the bivariate level ($P < 0{\cdot}05$). Likewise, we examined the independent contribution of diagnoses in the wife (the independent variables) to the husband's diagnosis (the dependent variable), considering all associated disorders in the wife.

When measuring spouse similarity for a characteristic that might be influenced by age (such as the lifetime prevalence of psychiatric disorder), a spurious spouse association may be observed unless a statistical procedure is introduced to correct for the effect of age, since spouse pairs tend to be similar for age (Sackett *et al*. 1975). We thus included subject age and the age difference between spouses as independent, adjustment variables in all regression models, a procedure similar to that of Speers and colleagues (Speers *et al*. 1986). Age difference was calculated by subtracting the wife's age from the husband's age.

As a first step in the regression analysis, first-order interactions between all disorders variables and between disorder and both age variables in each full regression model were tested for significance with the Likelihood Ratio χ^2 test (Kleinbaum, 1994). The rationale behind this strategy was to test, for example, whether the association between an alcohol disorder in the husband and the same disorder in the wife could be different depending on the presence of other disorders in the husband, the age of the wife, or the age difference between the husband and wife. This analysis was necessarily 'exploratory' given the lack of previous research in the literature which gives consideration to effect modification. If the Likelihood Ratio test was non-significant, all interaction variables were removed from the full models in one step. If the test was significant, stepwise backward elimination was used to remove interaction variables from the regression models one at a time if their

P values in the model were greater than 0·05, while retaining all main effects. The order in which variables were removed depended on the particular model being tested (23 models in total). Diagnosis variables not involved in significant interactions were then removed one at a time if their main effects were not significant. Subject age and age difference between spouses were kept in the final, reduced models regardless of their *P* value, as adjustment variables.

The data used in this study were not weighted. Weighting was not necessary because we examined associations within the sample rather than forming general population estimates. In addition, weights were generated in the original survey with respect to age and gender; gender is not relevant in our study of heterosexual couples and age was used as an adjustment variable in our multivariate analysis. We did not have to use matched analysis because we were not comparing frequencies or proportions in husbands *versus* wives; rather, couples were assigned to cells in the 2×2 table on the basis of their similarity (or dissimilarity) of diagnostic status.

RESULTS

Bivariate association for same disorders

Table 2 presents the results of the cross tabulations of disorder status for female *versus* male spouses, for each psychiatric disorder. The odds ratio (OR) for concordance (spouse similarity) was significantly greater than 1 at the 95% confidence level for manic episode, major depression, alcohol abuse or dependence, drug abuse or dependence and for having 'any' of the disorders studied. The point estimates for the significant odd ratios varied from 1·54 for 'any' disorder and 2·26 for major depression to 25·4 for manic episode. The odds ratio estimates should be interpreted with caution when there was only one couple with a diagnosis in both spouses (for manic episode, panic disorder and antisocial personality). No association was found between spouses for a diagnosis of somatization syndrome, using the subthreshold definition, or PTSD, as no spouses were dually-affected.

To take into account the role played by subthreshold forms of disorders, we also examined the association between spouses for counts of symptoms of the same disorder. A significant association between counts of symptoms was observed for all of the disorders that showed significant spousal association with the diagnostic variables. In addition, a significant association was observed for counts of symptoms of somatization syndrome, antisocial personality (sum of adult behavioural symptoms and conduct disorder symptoms), panic, generalized anxiety and PTSD. The correlation coefficients for the last three disorders, however, were small (i.e. less than 0·10).

Similar to the widening of the definition of somatization by using criteria for somatization syndrome, the DIS/DSM-III diagnosis for both PTSD and antisocial personality can be made with, or without, severity criteria. We repeated the analysis in Table 2 for these two diagnoses ignoring severity criteria and found that while there were still no couples concordant for PTSD (OR = 0), the spousal association for antisocial personality became significant, with an odds ratio of 11·3 (Table 2). The DIS/DSM-III definition of antisocial personality disorder with severity criteria requires the presence of three or more positive conduct disorder groups before age 15 and four or more positive adult behaviour problem groups, whereas the definition without severity criteria requires the presence of at least two and at least three groups, respectively. Since the existence of similarity for antisocial personality was also suggested by the fact that the correlation for number of symptoms was the highest noted in Table 2, we considered the second, less stringent definition to be more suitable and used it for the remainder of the analyses.

The association between spouses for affective disorder was studied further by examining unipolar and bipolar illness separately. A diagnosis of bipolar disorder was given if severity criteria were met for manic episode, or if severity criteria were met for depression and the subject had hypomania (atypical bipolar disorder). A diagnosis of unipolar disorder was given for single episode or recurrent depression that met severity criteria, and absence of manic symptoms. Fifteen couples were concordant for unipolar disorder and the associated odds ratio was 2·5 (95% CI: 1·28, 4·89). In comparison, two couples were concordant for bipolar illness: one for typical bipolar disorder (the couple

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Table 2. *Association between spouses for lifetime history of the same psychiatric disorder*

Disorder	Number of couples				Measure of association	
	Both spouses diagnosed	Only wife diagnosed	Only husband diagnosed	Neither spouse diagnosed	Diagnosis Odds ratio (95% CI)	Number of symptoms Tau-B
Manic episode	1	5	4	508	25·4 (2·39, 270)**	0·241***
Major depression	16	90	30	382	2·26 (1·18, 4·33)*	0·158***
Dysthymia	3	43	15	457	2·13 (0·59, 7·63)	No count
Phobia	4	60	28	427	1·02 (0·34, 3·0)	0·002
Panic	1	22	3	493	7·47 (0·75, 74·7)	0·089*
Generalized anxiety	19	72	63	365	1·53 (0·86, 2·71)	0·084*
Somatization syndrome	0	23	11	478	0	0·149***
PTSD	0	17	6	495	0	0·089*
Alcohol abuse/dependence	23	18	148	314	2·71 (1·42, 5·18)**	0·222***
Drug abuse/dependence	7	15	18	478	12·4 (4·50, 34·1)***	0·313***
Antisocial personality	1	6	33	478	2·41 (0·28, 20·6)	0·348***
Antisocial personality†	11	7	61	439	11·3 (4·22, 30·3)***	0·348***
Any of the above disorders	108	91	132	171	1·54 (1·07, 2·20)*	0·224***

* $P < 0{\cdot}05$; ** $P < 0{\cdot}01$; *** $P < 0{\cdot}001$.
† Without severity criteria.

Table 3. *Significant associations between spouses for lifetime history of different psychiatric disorders*

Wife disorder	Husband disorder	Number of couples				Odds ratio (95% CI)
		Both spouses diagnosed	Only wife diagnosed	Only husband diagnosed	Neither spouse diagnosed	
Major depression	Antisocial personality*	22	84	50	362	1·90 (1·09, 3·30)
Dysthymia	Generalized anxiety*	13	33	69	403	2·30 (1·15, 4·59)
	PTSD*	3	43	3	469	10·9 (2·14, 55·7)
Phobia	Drug abuse/dependence	7	57	18	437	2·98 (1·19, 7·45)
	Antisocial personality	16	48	56	399	2·38 (1·26, 4·46)
PTSD	Drug abuse/dependence*	4	13	21	480	7·03 (2·11, 23·4)
	Antisocial personality	7	10	65	436	4·70 (1·73, 12·8)
Alcohol abuse/dependence	PTSD*	2	39	4	458	5·87 (1·04, 33·1)
	Drug abuse/dependence	8	33	17	445	6·35 (2·55, 15·8)
	Antisocial personality	18	23	53	409	6·04 (3·06, 11·9)
Drug abuse/dependence	Phobia	5	17	27	469	5·11 (1·75, 14·9)
	Generalized anxiety*	9	13	73	423	4·01 (1·66, 9·72)
	Alcohol abuse/dependence	16	6	156	335	5·73 (2·20, 14·9)
	Antisocial personality	10	12	62	434	5·83 (2·42, 14·1)
Antisocial personality	Phobia	7	11	25	475	12·1 (4·32, 33·8)
	PTSD	2	16	4	496	15·5 (2·64, 90·9)
	Alcohol abuse/dependence	14	4	158	337	7·46 (2·42, 23·0)
	Drug abuse/dependence	8	10	17	483	22·7 (7·97, 64·8)

* Gender-specific associations.

concordant for manic episode in Table 2) and one for atypical bipolar illness (depression and hypomania); the odds ratio from the 2×2 table was 36·1 (5·66, 231).

Bivariate association for different disorders

Table 3 presents the significant associations observed for diagnoses of different disorders in the two spouses. Among these associations, six were observed for both genders; that is, disorder A in wives was associated with disorder B in husbands and disorder A in husbands was associated with disorder B in wives. These associations involved antisocial personality in one spouse and either phobia, PTSD, alcohol abuse/dependence or drug abuse/dependence in the other spouse, as well as drug abuse/dependence in one spouse and either phobia or

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Table 4. *Multivariate logistic regression results*

Psychiatric disorder in wife	Psychiatric disorder in husband	Adjusted odds ratio* (95% CI)	
		Wife disorder as dependent	Husband disorder as dependent
Manic episode	Manic episode	25·6 (1·99, 329)	24·8 (1·79, 344)
Major depression	Major depression	2·21 (1·15, 4·23)	2·20 (1·15, 4·22)
Major depression	Antisocial personality	NS	1·17 (0·60, 7·04)†
Dysthymia	Generalized anxiety	2·45 (1·20, 5·03)	2·31 (1·12, 4·73)
Dysthymia	PTSD	11·5 (2·19, 60·4)	12·3 (2·34, 64·4)
PTSD	Drug abuse/dependence	3·46 (0·85, 14·1)†	4·34 (1·09, 17·4)
PTSD	Antisocial personality	3·03 (0·94, 9·72)†	NS
Alcohol abuse/dependence	Antisocial personality	4·16 (2·05, 8·47)	3·13 (1·39, 7·04)†
Drug abuse/dependence	Generalized anxiety	3·08 (1·19, 7·99)	2·82 (1·12, 7·04)
Drug abuse/dependence	Alcohol abuse/dependence	NS	3·84 (1·45, 10·2)†
Drug abuse/dependence	Drug abuse/dependence	5·28 (1·76, 15·8)	NS
Drug abuse/dependence	Antisocial personality	NS	2·33 (0·88, 6·19)†
Antisocial personality	Phobia	6·14 (1·88, 20·1)	8·44 (2·86, 24·9)
Antisocial personality	Drug abuse/dependence	6·92 (2·19, 21·8)	7·49 (2·47, 22·7)

* Adjusted for subject age, difference in age between spouses, and any other significant diagnosis variables.
† Average effect only (not necessarily significant); interaction was present in these models (see results).

alcohol abuse/dependence in the other spouse. The six remaining associations presented in Table 3 were gender-specific: generalized anxiety in husbands was associated with dysthymia and drug abuse/dependence in wives; male PTSD was associated with female dysthymia and alcohol abuse/dependence; female major depression was associated with male antisocial personality; and PTSD in wives was associated with drug abuse/dependence in husbands. The odds ratio estimates for the associations between male PTSD and female dysthymia (three couples), female alcohol abuse/dependence (two couples) or female antisocial personality (two couples) should be interpreted with caution because of the low number of concordant couples.

Multivariate analysis

Table 4 presents the results of logistic regression analyses with female and male disorders as the dependent variables, respectively. For each association between a wife's diagnosis and a husband's diagnosis found to be significant, the third column of Table 4 presents the adjusted odds ratio in the final model when the wife's disorder was the dependent variable while the fourth column contains the adjusted odds ratio when the husband's disorder was the dependent variable. If any interaction terms were found to be significant, the adjusted odds ratio in Table 4 represents an average effect only, and the effect modification is described in more detail below. The strength of the association was not always the same in the third and fourth columns, likely because of differences between genders regarding the role played by co-morbid disorders in the spouse. In a few cases, these gender differences resulted in the association being significant in only one direction: the association between drug abuse/dependence in both spouses, for example, was significant only when the wife disorder was the dependent variable.

The role played by co-morbid disorders and the adjustment for age factors account for the fact that many associations significant in the bivariate analysis were no longer significant at the multivariate level. Of the 23 associations between either the same type of disorder (5) or different types of disorders (18) observed bivariately, 14 remained significant in the multivariate analysis. An association between spouses for the same type of disorder was observed only for affective disorders and drug abuse/dependence. For both manic episode and major depression the association was significant with either the wife's disorder as the dependent variable or the husband's disorder as the dependent variable. For drug abuse/dependence, the association was significant only when the wife disorder was the dependent variable. The associations between spouses for presence of alcohol abuse/dependence and antisocial personality (according to the less stringent

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definition) observed at the bivariate level were no longer significant.

Regarding the association between spouses for different diagnoses, we can identify from Table 4 several associations involving antisocial personality and addiction disorders. There was a strong association between antisocial personality in wives and drug abuse/dependence in husbands. The association between male antisocial personality and female drug abuse/dependence was not significant when the female disorder was the dependent variable. When male antisocial personality was the dependent variable, however, we observed a significant interaction between the female diagnoses of drug abuse/dependence and major depression, with the association between female drug abuse/dependence and male antisocial personality being apparent only when female major depression was absent. Similarly, the association between female alcohol abuse/dependence and male antisocial personality as the dependent variable was modified by the female depression variable; in this case, the association was apparent only in wives who also had a lifetime history of major depression.

A possible interpretation of the above interactions is that wives, in reaction to their husband's antisocial personality, could begin to abuse alcohol when they have a previous history of depression or abuse drugs when they do not have such a history. However, we do not know when cohabitation began and hence cannot exclude the possibility that the female addiction disorder was already present and thus not secondary to the male antisocial behaviour. The association between male antisocial personality and female alcohol abuse/dependence was strong and significant when the latter disorder was the dependent variable. Finally, we observed an association between female drug abuse/dependence and male alcohol abuse/dependence when the male disorder was the dependent variable; this association, however, was influenced by male age, being apparent only for men 40 years of age and younger.

Antisocial personality disorder and drug abuse/dependence were also associated with the presence of anxiety disorders in the spouse. In husbands, both antisocial personality and drug abuse/dependence were associated with PTSD in wives, but the association between female PTSD and male antisocial personality was not significant when the male disorder was the dependent variable. The association of male drug abuse/dependence with female PTSD as the dependent variable was influenced by female age, being apparent only for women 30 years of age or older, while the association of male antisocial personality with female PTSD was modified by the age difference between the spouses, being observed only when the male was older than the female. Antisocial personality in wives was strongly associated with the presence of phobia in husbands, and female drug abuse/dependence was associated with male generalized anxiety disorder. In addition to the associations involving antisocial personality and addiction disorders, we also observed an association between dysthymia in wives and anxiety disorders in husbands, namely generalized anxiety and PTSD, regardless of whether the wife or husband variables were dependent.

DISCUSSION

In a sample of 519 couples from the general population, we studied patterns of association between lifetime psychiatric histories of spouses. Regarding the bivariate associations between spouses for the same type of psychiatric disorder, we identified a significant association for the lifetime existence of any disorder and the following individual diagnoses: manic episode, major depression, alcohol abuse/dependence, drug abuse/dependence and antisocial personality. For this last diagnosis, the association was only significant when a less stringent definition was used. In multivariate regression analysis, the association between spouses for affective disorder and drug abuse/dependence remained significant, but the other bivariate associations appeared to be mostly explained by spousal association for disorders co-morbid with these diagnoses.

The occurrence of spouse similarity for affective disorders has been widely studied, but the results are contradictory. Five studies reported an absence of significant spousal association for the presence of affective disorders (Gershon *et al.* 1975; Negri *et al.* 1979, 1981; Waters *et al.* 1983; Heun & Maier, 1993). Among the six studies that did observe spousal

association, there were differences in the patterns of association (Gershon *et al.* 1973; Dunner *et al.* 1976; Baron *et al.* 1981; Merikangas & Spiker, 1982; Merikangas *et al.* 1988*a*; Colombo *et al.* 1990). First, regarding type of affective disorder (bipolar *versus* unipolar), three studies observed an association for both bipolar and unipolar disorder (Gershon *et al.* 1973; Baron *et al.* 1981; Merikangas & Spiker, 1982); the last of these found a higher degree of association for bipolar than for unipolar disorder. One study identified an association between spouses for bipolar but not unipolar disorder (Dunner *et al.* 1976) and another only found an excess of bipolar disorder in wives of male unipolar patients (Colombo *et al.* 1990). Secondly, concerning gender, in three of the six studies the excess of affective disorder was observed in wives of male patients, but not in husbands of female patients (Gershon *et al.* 1973; Dunner *et al.* 1976; Colombo *et al.* 1990). However, as we have previously indicated (Galbaud du Fort *et al.* 1994), the observation that wives are more likely than husbands to be concordant with an ill spouse can be explained by the fact that women exhibit a higher prevalence for affective disorders and a greater propensity to seek professional help for emotional problems.

A major limitation of this previous research is the fact that all of the studies used clinical samples and thus contain selection bias. In addition, none examined the potential confounding role played by co-morbid psychiatric diagnoses. In our sample, we observed significant spouse similarity for the occurrence of both major depression and mania. The spousal association for mania was stronger than that for depression; the concordance was also higher for bipolar than for unipolar illness. Although the latter result is based on the existence of only two couples concordant for bipolar disorder (including one couple concordant for atypical bipolar disorder), it is also consistent with the finding that the spousal correlation for number of symptoms was almost twice as high for manic symptoms as for those of depression. In the multivariate analysis, the existence of major depression in one spouse remained significantly associated with major depression in the other spouse and a similar result was observed for mania, with odds ratios very similar to that obtained in the bivariate analysis. Thus, psychiatric co-morbidity appears to play a negligible confounding role, and evidence for significant spouse similarity for affective disorders exists.

We observed complex patterns of spousal association regarding antisocial personality and alcohol and drug addiction disorders. The existence of a spousal association for antisocial personality has been suggested by two studies that have studied spouses of convicted felons (Guze *et al.* 1970; Cloninger *et al.* 1975), but was not supported by a study of parents of children referred to a psychiatric clinic within a juvenile justice court (Lewis *et al.* 1976). Spouse similarity for alcohol abuse and dependence has been studied both in clinical samples (Rimmer & Winokur, 1972; Moos *et al.* 1982; Hall *et al.* 1983; Moskalenko *et al.* 1992) and in the general population (Gleiberman *et al.* 1992; McLeod, 1993; Schuckit *et al.* 1994). Although different methods of defining alcoholism were used, all have been consistent in finding an association between spouses for heavy drinking and alcoholism. However, only one investigated the occurrence of co-morbid psychiatric diagnoses in spouses (Rimmer & Winokur, 1972). Regarding drug addiction, although it has been reported that at least 25% of the total treatment population in methadone maintenance programmes consists of couples where both partners are addicted to narcotics (Clark *et al.* 1972; Farkas, 1976) and some research has studied the similarity of behavioural patterns in such couples (Anglin *et al.* 1987), we did not find any studies that have measured spouse similarity for drug abuse or dependence in the general population.

We observed significant spouse similarity for antisocial personality disorder, alcohol abuse/dependence, and drug abuse/dependence at the bivariate level. In multivariate analysis, only the spousal association for drug abuse/dependence remained significant, and exclusively when the wife disorder was the dependent variable. In addition, antisocial personality in husbands was associated with alcohol and drug abuse/dependence in wives (with effect modification by the presence of depression in wives) and female antisocial personality was associated with male drug abuse/dependence. In the light of the fact that antisocial personality and addictions are often co-morbid in individuals, our results should be interpreted as indicating an association between spouses for the spectrum

constituted by these disorders rather than for a specific diagnosis among them.

This study is, to our knowledge, the first systematic investigation of associations between spouses for different psychiatric diagnoses. Studies focusing on patients with a specific disorder have occasionally investigated the presence of other types of disorders in their spouses. Although generally not reaching significance, some of the results suggested the existence of spousal associations. Among the studies of patients with primary affective disorder, an excess of alcoholism among spouses was suggested by four studies (Negri *et al*. 1979, 1981; Merikangas & Spiker, 1982; Merikangas *et al*. 1988*b*) but not supported by two others (Gershon *et al*. 1973; Dunner *et al*. 1976); an excess of anxiety among spouses was suggested by Negri *et al*. (1979, 1981) and Merikangas and colleagues (1988*b*) and confirmed by Colombo *et al*. (1990), who observed a significant association between the presence of bipolar disorder in wives and generalized anxiety in husbands. Rimmer & Winokur (1972) observed that prevalence rates of alcoholism, depression, sociopathy and schizophrenia among spouses of 59 alcoholics were higher than among controls, and similar to those found among the alcoholics' first-degree relatives. Finally, in spouses of schizophrenic patients, an excess of alcoholism was suggested by three studies (Fowler & Tsuang, 1975; Parnas, 1985, 1988) but disputed by one study (Alanen & Kinnunen, 1975) and an excess of antisocial personality disorder was indicated by Rosenthal (1975).

In addition to the associations between antisocial personality and addictive disorders noted above, we observed an association between antisocial personality in one spouse and anxiety disorders in the other spouse, namely posttraumatic stress disorder in wives and phobia in husbands. Drug abuse/dependence in one spouse was also associated with anxiety disorders in the other spouse (PTSD in wives and generalized anxiety in husbands) and female dysthymia was associated with male generalized anxiety and PTSD.

The existence of these spousal associations has the same clinical and research implications as those noted for similarity for the same disorders (Merikangas, 1982). Clinically, the presence of antisocial personality in the spouse, for example, is likely to have some influence on the treatment course and outcome of a patient treated for a substance use or anxiety disorder; similarly, the treatment outcome for women treated for dysthymia may be affected by the presence of an anxiety disorder in the husband, and vice versa. At the scientific level, although the impact of parental concordance for affective disorders on offspring psychopathology has already been investigated (Merikangas *et al*. 1988*a*, *b*), research aimed at understanding why, as noted by Kendler (1990), the major psychiatric disorders tend to aggregate in families should take into account the existence of spousal associations for different psychiatric diagnoses. For instance, our finding of an association between female mood disorder and male anxiety disorder may have implications for family studies investigating the hypothesis advanced by Kendler (1996) that common genetic factors influence the liability to major depression and generalized anxiety disorder.

A possible limitation of our study pertains to the fact that the representativeness of our sample is not absolute. For five diagnoses in women, two diagnoses in men and one diagnosis in both genders, there was a higher lifetime prevalence in the study sample than in the general population sample of married persons. However, in both genders the prevalence of overall psychiatric morbidity (presence of 'any' disorder) did not differ significantly from that in the general population, indicating that our sample is representative with respect to the prevalence of psychiatric cases even though there is an excess of co-morbidity in some of our cases.

Regarding the higher prevalence of affective disorders (manic episode, major depression and dysthymia) in our female sample, the fact that this is not paralleled by a corresponding excess in males indicates that we slightly oversampled discordant pairs with the wife affected and the husband not affected by the disorder. Hence, our measurement of spousal association for these disorders may underestimate the true degree of association; the association between spouses for mania and major depression may be higher than that observed. In comparison, the excess of phobia in both genders raises the possibility that we may have oversampled pairs of spouses concordant for this diagnosis; this would lead to an overestimate of the spousal

association only if concordant pairs were more likely to be oversampled than discordant pairs. We did not, however, observe a significant association for phobia.

In a similar manner, the spousal associations that we detected for different disorders (e.g. between disorder A in wives and disorder B in husbands) may be overestimated if there is an excess of both disorder A in wives and disorder B in husbands in our sample. For the associations presented in Table 4 this pattern was only observed for generalized anxiety in husbands and dysthymia or drug abuse/dependence in wives. These two results, therefore, should be interpreted with caution as they may overestimate the association if concordant pairs were more likely to be oversampled than discordant couples.

Two other methodological issues need to be addressed. First, the existence of contamination between spouses during data collection – the influencing of the answers of one spouse by communication with the other spouse – can be excluded since the interviews were done individually at different times and in the absence of the partner. This reduces the possibility of measurement bias (the influencing of diagnostic results by similarity or dissimilarity between spouses). Secondly, although the DIS has proven to be a reliable and valid instrument, we cannot rule out the possibility of some misclassification (i.e. false positives or false negatives). However, our study focuses on the association between spouses for the presence of psychiatric diagnoses, and not on the prevalence of these disorders. Any misclassification of diagnostic status would only tend to reduce the extent of the observed similarity (Copeland *et al*. 1977).

The main limitation of our study rests in the cross-sectional nature of the data, restricting our ability to infer causal relationships. For some associations that we have identified, clinical experience may suggest explanatory mechanisms. For instance, for the association between antisocial personality in one spouse and anxiety disorder in the other spouse, it is possible that cohabiting with someone exhibiting antisocial personality may expose the spouse to traumatic events or a stressful environment that induce anxiety. However, we do not know when cohabitation began in our sample. The spousal associations can thus be explained by different mechanisms depending on whether the disorders were already present in couples before they started to cohabit (assortative mating), psychiatric illness developed in one spouse after a certain amount of exposure to a sick spouse (contamination) or disorders developed at the same time after the spouses were exposed to the same stressor, such as a major life event or a marital conflict (shared environment).

In addition to confirming the existence of spousal association for affective disorders and for the spectrum of antisocial personality and addictions, the fundamental contribution of this study to the research body is the identification of the existence of associations between spouses for different psychiatric disorders. This information has important implications for clinicians as well as for researchers. Future research should aim at exploring the aetiological mechanisms of these associations.

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