Sex Differences in Symptoms of Depression in Unrelated Individuals and Opposite-Sex Twin and Sibling Pairs

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Diagnosis of a major depressive episode by the *Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association* requires 5 out of 9 symptoms to be present. Therefore, individuals may differ in the specific symptoms they experience and reach a diagnosis of depression via different pathways. It has been suggested that depressed women more often report symptoms of sleep disturbance, appetite or weight disturbance, fatigue, feelings of guilt/worthlessness and psychomotor retardation than depressed men. In the current study, we investigate whether depressed men and women differ in the symptoms they report. Two samples were selected from a sample of Dutch and Australian twins and siblings. First, Dutch and Australian unrelated depressed individuals were selected. Second, a matched epidemiological sample was created consisting of opposite-sex twin and sibling pairs in which both members were depressed. No sex differences in prevalence rates for symptoms were found, with the exception of decreased weight in women in the sample of unrelated individuals. In general, the similarities in symptoms seem to far outweigh the differences in symptoms between men and women. This signifies that men and women are alike in their symptom profiles for major depression and genes for depression are probably expressed in the same way in the two sexes.

Subjects diagnosed with depression differ widely in symptom presentation. This is reflected in the classification for major depression, which requires five out of nine possible symptoms to be present (American Psychiatric Association, 1994). The nine symptoms are: (1) sad mood, (2) anhedonia, (3) sleep disturbance defined as either insomnia or hypersomnia, (4) appetite/weight disturbance as either increased or decreased appetite/weight, (5) psychomotor changes defined as either retardation or agitation, (6) lack of energy, (7) feelings of worthlessness, (8) lack of concentration, and (9) thoughts of death. The presence of sad mood or anhedonia is obligatory in adults, but no other requirements are made. As a consequence, two subjects diagnosed with depression can greatly differ in their symptom profile. This has raised the question as to whether depressed men and women differ in the symptoms they express. Earlier studies have found that depressed women, compared to depressed men, tend to exhibit more symptoms of sleep disturbance (Angst & Dobler-Mikola, 1984; Kornstein et al., 2000), appetite or weight disturbance (Angst & Dobler-Mikola, 1984; Carter et al., 2000; Ernst & Angst, 1992; Frank et al., 1988; Young et al., 1990), fatigue (Vredenburg et al., 1986), feelings of guilt/worthlessness (Ernst & Angst, 1992) or psychomotor retardation (Kornstein et al., 2000). When the appetite or weight disturbance is specified, women report increased appetite or weight more often than men (Carter et al., 2000; Frank et al., 1988; Young et al., 1990). When clusters of symptoms are studied, higher prevalence rates are found in women for atypical depression or for somatic depression, defined as depression with symptoms of sleep disturbance, fatigue or appetite disturbance (Benazzi, 1999; Silverstein, 1999, 2002). To investigate these differences in a matched epidemiological sample, Khan et al. (2002) studied opposite-sex dizygotic twin pairs in which both twins were diagnosed with depression. They found that fatigue, hypersomnia and psychomotor retardation were more often reported by women, whereas insomnia and agitation were more often reported by men. To summarize, these studies suggest that depressed men and women are similar in the prevalence rates for sad mood, anhedonia, lack of concentration and thoughts of death. Differences in prevalence rates are reported for the other symptoms,

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but from the results so far, no consistent pattern of differences can be perceived to discriminate depressed women from depressed men. Sleep and appetite or weight disturbance are mostly found to differ, but not always in combination. This could be explained by some studies analyzing sleep and appetite disturbance instead of insomnia, hypersomnia, decreased and increased appetite.

In the current study, two samples were selected from a group of Australian and Dutch twins and siblings, who participated in a psychiatric interview (Kirk et al., 2000; Middeldorp et al., 2006). First, a large sample of unrelated Australian and Dutch men and women diagnosed with *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; DSM-IV; American Psychiatric Association, 1994) major depression were selected. Second, following the study of Khan et al. (2002), a matched epidemiological sample of Australian and Dutch depressed opposite-sex twin and sibling pairs was formed. In both samples, differences in prevalence rates for symptoms of depression were analyzed.

Methods

Subjects

Data were collected in the Australian and Netherlands Twin Registers as part of a project aiming to find the genes underlying the susceptibility to anxiety and depression. For a detailed description of the data collection, see Kirk et al. (2000), Boomsma et al. (2000) and Middeldorp et al. (2006). In short, in 1998, the most informative families for a linkage study on anxiety and depression were selected by choosing sibling pairs that were either concordant or discordant with respect to extreme neuroticism scores derived from the self-completed Eysenck Personality Questionnaire (Eysenck et al., 1985) in the Australian sample. In the Dutch sample, selection was based on genetic factor scores. These factor scores represent a composite index of neuroticism, anxiety and depression and are derived for each subject based on a genetic multivariate analysis of these phenotypes in the Dutch sample (Boomsma et al., 1990; Boomsma et al., 2000). Twins and siblings of these families were asked to provide their DNA and to participate in a psychiatric interview. There were 2470 Australian and 1256 Dutch individuals who were interviewed.

Instruments

All offspring from selected families were asked to participate in a telephone interview, during which the computerized version of the Composite International Diagnostic Interview (CIDI; World Health Organization, 1992) was administered to obtain lifetime DSM-IV diagnoses of mood and anxiety disorders. The CIDI is a fully standardized diagnostic interview. All interviewers were trained by the Dutch and Australian World Health Organization training centers and were unaware of interviewees' scores on the initial selection variables throughout the study. In the current study, data on major depressive disorder single episode and recurrent episode were analyzed (DSM-IV diagnostic codes 296.2x and 296.3x respectively).

Statistical Methods

In a univariate logistic regression performed in SPSS version 13.0, the different symptoms were included as the dependent variable and sex as the independent variable. The odds ratios (OR) are reported. The effect of sex was significant if $p < .05$, based on the Wald statistic.

Table 1

N (%) Men and Women and the Female–Male Odds Ratio for Each Symptom That Can Be Expressed During a Depressive Episode in a Sample of 173 Unrelated Depressed Men and 403 Women

DSM-IV diagnostic criterion	Men *N* = 173	Women *N* = 403	Female–Male OR	*p*
1 Sad mood	162 (93.6%)	382 (94.8%)	1.24	*ns*
2 Loss of interest	139 (80.3%)	326 (80.9%)	1.04	*ns*
3 Decreased appetite	106 (61.3%)	260 (64.5%)	1.15	*ns*
3 Decreased weight	53 (30.6%)	172 (42.7%)	1.69	< .01
3 Increased appetite	30 (17.3%)	94 (23.3%)	1.45	*ns*
3 Increased weight	21 (12.1%)	57 (14.1%)	1.19	*ns*
4 Insomnia	144 (83.2%)	319 (79.2%)	0.77	*ns*
4 Hypersomnia	56 (32.4%)	128 (31.8%)	0.97	*ns*
5 Psychomotor retardation	49 (28.3%)	116 (28.8%)	1.02	*ns*
5 Agitation	42 (24.3%)	71 (17.6%)	0.67	*ns*
6 Lack of energy	150 (86.7%)	357 (88.6%)	1.19	*ns*
7 Guilt	85 (49.1%)	165 (40.9%)	0.72	*ns*
8 Diminished concentration	166 (96.0%)	395 (98.0%)	2.08	*ns*
9 Thoughts about death	96 (55.5%)	239 (59.3%)	1.17	*ns*

Note: OR = odds ratio.

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Table 2

N (%) Men and Women and the Female–Male Odds Ratio for Each Symptom That Can Be Expressed During a Depressive Episode in a Sample of 130 Depressed Opposite-Sex Twin/Sibling Pairs

DSM-IV diagnostic criterion	Men	Women	Female–Male OR	*p*
1 Sad mood	61 (94%)	61 (94%)	1.00	*ns*
2 Loss of interest	53 (81.5%)	48 (73.8%)	0.64	*ns*
3 Decreased appetite	39 (60.0%)	43 (66.2%)	1.30	*ns*
3 Decreased weight	23 (35.4%)	29 (44.6%)	1.47	*ns*
3 Increased appetite	11 (16.9%)	15 (23.1%)	1.47	*ns*
3 Increased weight	7 (10.8%)	5 (7.7%)	0.69	*ns*
4 Insomnia	53 (81.5%)	49 (75.4%)	0.69	*ns*
4 Hypersomnia	24 (36.9%)	21 (32.3%)	0.82	*ns*
5 Psychomotor retardation	21 (32.3%)	26 (40.0%)	1.40	*ns*
5 Agitation	18 (27.7%)	13 (20.0%)	0.65	*ns*
6 Lack of energy	57 (87.7%)	61 (93.8%)	2.14	*ns*
7 Guilt	31 (47.7%)	31 (47.7%)	1.00	*ns*
8 Diminished concentration	65 (100.0%)	64 (98.5%)	*	*ns*
9 Thoughts about death	36 (55.4%)	43 (66.2%)	1.57	*ns*

Note: OR = odds ratio.

*Since the cell with men reporting no diminished concentration was empty, no OR could be calculated.

Results

The prevalence rates for depression were 25% and 15% in the 2470 Australian and 1256 Dutch individuals respectively. The higher incidence in the Australian sample may be due to a significant age difference. The Australian subjects were older than the Dutch participants (mean age of 42 years and 28 years respectively). The difference in frequencies could also be partly explained by coincidental differences in the selection. In Australia, 43% of the interviewed subjects had an extreme high neuroticism score, while in the Netherlands, 32% had an extreme genetic factor score. Earlier analyses have shown that subjects with high scores on neuroticism (Australia) or on the questionnaires used to calculate the genetic factor scores (the Netherlands) are more likely to get a diagnosis (Kirk et al., 2000; Middeldorp et al., 2006). A group of 173 unrelated depressed men and 403 women was created by randomly selecting one depressed member from each family. There were 130 opposite-sex twin/sibling pairs in which both twins or siblings were depressed.

Table 1 and 2 show the results for the unrelated individuals and the opposite-sex twin/sibling pairs. With the exception of the symptom of decreased weight, which is more prevalent in depressed women in the unrelated individuals ($p < .01$), no significant differences were found between depressed men and women regarding the prevalence of the separate symptoms. In both samples, the mean number of depressed symptoms varied between 6.8 and 6.9 in men and women, and thus was not significantly different either.

Differences in symptoms between men and women were also analyzed in the Dutch and Australian unrelated individuals separately to check whether the results were comparable in the two samples. In the Australian sample ($N = 433$), women more often reported decreased weight ($p < .05$), but fewer feelings of guilt ($p < .05$). In the Dutch sample ($N = 143$), women more often reported decreased appetite ($p < .05$) and decreased weight ($p < .05$), but less agitation ($p < .05$).

Discussion

Men and women had similar major depression symptom profiles. We observed these similar profiles both in a sample of unrelated subjects as well as in a sample consisting of opposite-sex twin/sibling pairs. Only a decrease in weight was more often reported by women than by men in the unrelated subjects. But given the number of tests that were carried out, this could be due to chance.

These results are in line with other studies regarding the symptoms of sad mood, anhedonia, lack of concentration and thoughts of death (Angst & Dobler-Mikola, 1984; Benazzi, 1999; Carter et al., 2000; Ernst & Angst, 1992; Frank et al., 1988; Khan et al., 2002; Kornstein et al., 2000; Silverstein, 1999, 2002; Vredenburg et al., 1986; Wilhelm et al., 2002; Young et al., 1990). For the other symptoms, that is, sleep disturbance, appetite or weight disturbance, fatigue, psychomotor retardation and feelings of guilt/worthlessness, differences between the prevalence rates have been reported for each symptom, but not consistently across studies. There are several reasons for discrepancies in results between studies. Samples vary from population-based to clinical or even including chronic depressed subjects only. Different criteria are used to define depression. In some studies experiencing sad mood or anhedonia is enough to be categorized as

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depressed, whereas in other studies DSM-IV criteria (American Psychiatric Association, 1994) are used. Studies are also performed in several countries. Although our results of the analyses of the Dutch and Australian sample separately do not suggest large differences between countries, it is not excluded that there are no differences at all between the expression of symptoms in several countries.

Overall, it seems that similarities in symptoms reported by men and women diagnosed with DSM-IV major depression far outweigh the differences. This signifies that, although women have been repeatedly found to have a higher rate of major depression than men (e.g., Bijl et al., 1998; Kessler et al., 1994), depressed men and women are very much alike and genes for depression are probably expressed in the same way in men and women. These results, together with an earlier study in the combined sample of Australian and Dutch twins and siblings that showed no significant difference between the genes influencing depression in men and women (Middeldorp et al., 2005), indicate that studies aiming to find the genes for depression may pool and simultaneously analyze data on major depression from men and women.

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