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Special article

Are gender differences in depression explained by gender differences in co-morbid anxiety?

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Abstract

Background: This review tested the hypothesis that gender differences in depression rates are a function of gender differences in co-morbid anxiety disorders. *Method:* We identified studies using diagnostic criteria, and reporting rates of pure depression, pure anxiety and co-morbid depression and anxiety, separately for females and males. The results of these studies were examined to assess the level of support for the co-morbidity hypothesis. *Results:* Although some studies supported or partially supported the hypothesis, the methodologically superior studies did not. *Conclusions:* We conclude that women are more likely than men to be diagnosed with either disorder alone or co-morbidly. Furthermore, the ratio of women to men who experience anxiety alone or anxiety in combination with depression tends to be higher than the ratio of women to men who experience depression alone. Attempts to explain the gender difference in rates of depression would benefit from an understanding that women also are more likely to experience anxiety.

Keywords: Depression; Anxiety; Gender differences; Comorbidity

1. Introduction

Over the past three decades, the gender difference in rates of depression has become an accepted truth in both research and clinical settings. Consistent historically and across cultures, women are approximately twice as likely as men are to experience depression (cf. recent reviews by Nolen-Hoeksema, 1990; Wolk and Weissman, 1995; Bebbington, 1996; Sprock and Yoder, 1997). Prevalence rates vary from study to study but are broadly consistent. For instance, the National Comorbidity Survey in the United States reported lifetime prevalence rates for major depression of 21% for women and 13% for men (Kessler et al., 1993). The literature consistently indicates that both diagnostic syndromes and depressive symptoms are more prevalent among boys than girls until adolescence, when rates for girls increase while rates for boys stabilize, until the 2:1 ratio is established (cf. reviews by Nolen-Hoeksema and Girgus, 1994; Hankin and Abramson, 1999). Some evidence suggests that this ratio is not evident beyond the age of 55 (Bebbington et al., 1998).

Many possible explanations for this difference have been advanced. The artefact hypothesis suggests that the gender difference is more apparent than real

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because women report more symptoms of emotional distress and seek help more readily than men do (Weissman and Klerman, 1977; Angst and Dobler-Mikola, 1984; Young et al., 1990). In addition, men may more likely to express their depression through alcoholism (Fava et al., 1996; Rutz, 1996). While there is some support for these arguments, the artefact hypothesis does not appear to account for the gender difference in depression rates (cf. reviews by Nolen-Hoeksema, 1990; Weissman et al., 1993).

A variety of biological, social, and psychological explanations for women's increased vulnerability to depression also has been evaluated. Research examining hormonal influences has received more attention than biological factors but both have produced inconclusive results and presently do not appear to account for the gender difference in rates (cf. reviews by McGrath et al., 1990; Rice et al., 1984; Kornstein, 1997). Other studies have noted the importance of factors such as gender-based social roles, discrimination in the workplace, power imbalances in relationships, childhood adversity, ruminative coping styles, and violence in the form of sexual and physical assault (Bebbington et al., 1998; McGrath et al., 1990; Wilhelm and Parker, 1989; Silverstein and Lynch, 1998; Veijola et al., 1998). Women are disadvantaged relative to men on all of these variables. When social and psychological factors are linked to the onset and course of depression, variables such as ruminative coping styles appear to increase vulnerability and maintain depressive symptoms (McGrath et al., 1990; Nolen-Hoeksema and Girgus, 1994).

Recent etiological research on gender differences in depression rates spans both biological and social explanations and suggests that childhood sexual abuse (CSA) may be an important risk factor for depression (Whiffen and Clark, 1997; Lynskey and Fergusson, 1997; Levitan et al., 1998; Weiss et al., 1999). There is preliminary evidence that a history of CSA is associated with long-term neurobiological changes which may increase vulnerability to depression in adulthood (Weiss et al., 1999). Given that girls are at least two to three times more likely than boys to be the victims of sexual abuse (Nolen-Hoeksema and Girgus, 1994), this factor may additionally contribute to the gender difference in depression rates.

A closer look at the literature on gender differences in rates of depression reveals a potentially critical component that may have been overlooked in previous attempts to explain this phenomenon. In a published letter to the editor of the *American Journal of Psychiatry*, Ochoa et al. (1992) reported a re-analysis of data collected at the Center for Cognitive Therapy. Patients' diagnoses were determined using the Structured Clinical Interview for DSM-III-R. The authors reported that, when anxiety was not co-morbid with depression, the gender ratio was approximately 1:1. The same result was found when depression was not co-morbid with an anxiety disorder. However, when the disorders co-occurred, the ratio jumped to 2:1. Thus, they speculated that the apparent gender difference in depression rates is actually a gender difference in rates of co-morbid depression and anxiety. The implications of this hypothesis are profound. If gender differences in depression disappear when anxiety disorders are controlled, then the search for an explanation for women's greater vulnerability to depression should focus specifically on an explanation for women's greater propensity to experience co-morbid depression and anxiety. Ochoa and his colleagues (1992) did not publish their data formally. However, they proposed a testable hypothesis. Are women more likely than men to experience pure depression and anxiety or are they more likely to experience only co-morbid depression and anxiety? The objective of this paper was to briefly review the extant literature to assess the merit of Ochoa et al.'s hypothesis.

2. Method

Certain criteria were imposed on the studies included in this review. Studies had to define depression by DSM or ICD criteria as major depression or dysthymia because these are the two disorders that consistently show a gender difference in rates. Similarly, anxiety had to be defined as meeting diagnostic criteria, but could be reported either by subtype or at the level of the global category. With the exception of the Lundby study (see below), depression or anxiety were deemed 'pure' either when depression was present without associated symptoms or the syndrome of anxiety or when anxiety was present without associated symptoms or the syndrome of depression. A complicating factor is whether researchers defined co-morbidity as concurrent episodes or as

Table 1
Female: male ratios for pure depression, pure anxiety, and co-morbid depression/anxiety

Study	Type	*N*	Depression	Anxiety	Dep/Anx
Angst et al. (1997)	Community	591	1.1	1.6	1.8
Breslau et al. (1995)	Community	1007	1.2	1.4	1.9
Hagnell and Gräsbeck (1990)	Community	2550	2.3	2.3	1.9
Murphy (1990)	Community	1003	1.2*	3.3*	1.3*
Blazer et al. (1994)	Community	8098	1.6	1.6	1.6
Ochoa et al. (1992)	Clinical	1051	1.1	1.3	1.9
Regier et al. (1990)	Comm/Clin	20 000	2	1.8	2.2

Male and female rates are reported as ratios. * Point prevalence ratios. All others are lifetime prevalence ratios with the exception of Angst et al. which was a current episode at time of interview and Ochoa et al. which was undefined. Co-morbid values for the National Comorbidity Survey include substance abuse, manic episode and non-affective psychosis.

separate episodes occurring during the same time period, whether that time period was the past month, the past 6 months, or one's lifetime. The issue of when the episodes occurred will be discussed on a study by study basis. In Table 1, we summarize the results of several studies that provided data relevant to this question. To compare the rates obtained across different studies, we calculated female:male ratios for each study and for the diagnostic categories of interest: pure depression, pure anxiety and co-morbid anxiety and depression. Of the six studies considered, all but one (the ECA study) sampled community rather than clinical populations.

3. Results and discussion

Angst et al. (1990, 1997) collected data in a relatively small community sample from Switzerland. Threshold depression and anxiety diagnoses were derived using the DSM-III-R criteria. Diagnostic categories included major depression, panic disorder, mild panic disorder, generalized anxiety disorder, agoraphobia plus social phobia, and simple phobia. Participants with subthreshold depression and anxiety were also included (for definitions see Angst et al., 1997). Either threshold or subthreshold anxiety or depression had to be present at one of the five interviews over a 15-year period, but the two disorders were not necessarily concurrent. In accordance with Ochoa et al.'s (1992) hypothesis, women were more likely than men to experience co-morbid anxiety and depression, while the ratio for pure depression was approximately equal. However, women also were more likely to be diagnosed with pure anxiety than men were. Thus, these data provide partial support for Ochoa et al.'s hypothesis.

In a community-based study in Atlantic Canada, participants were assessed twice, in 1952 and 1970, with a diagnostic system of the authors' design (Murphy, 1990). The system used the language of the DSM-I but classification strategies closely related to the DSM-III-R, in that there was a focus on syndromes, duration, intensity, co-occurring symptoms or syndromes, and functional impairment. A diagnosis of depression was similar to Major Depressive Episode (MDE). Anxiety diagnosis was based on fearful or apprehensive mood and a number of psychosomatic symptoms such as headaches. Comorbidity was defined as a diagnosis of depression plus anxiety at each of the two interview times. While the point prevalence rates of pure depression and co-morbid depression and anxiety were only slightly higher for women than men, women were more than three times more likely to be diagnosed with anxiety alone. Thus, while the almost equal pure depression ratio supports Ochoa et al.'s suggestion, results for the other two categories are the opposite of what they predicted.

Breslau and colleagues (1995) collected data from 1007 young adults who were members of a common HMO and who lived in an urban region of the US. They were interviewed twice over a period of 3.5 years using The National Institute of Mental Health Diagnostic Interview Schedule (NIMH DIS) revised to cover DSM-III-R disorders. Diagnoses included: major depressive disorder (MDD); panic disorder (PD); generalized anxiety disorder (GAD); obsessive–compulsive disorder (OCD); post-traumatic stress disorder (PTSD); social phobia; and simple

phobia. Anxiety disorders were grouped under the category 'Any Anxiety Disorder', thus, when MDD and Any Anxiety Disorder co-occurred at any time during the lifespan they were deemed comorbid. Lifetime rates of co-morbid depression and anxiety were approximately twice as high for women as for men, while lifetime rates for pure anxiety were somewhat higher for women. In contrast, lifetime rates for pure depression were approximately equal. The findings from this study most closely match Ochoa and his colleagues' (1992) hypothesis in that the ratios for the pure forms of either disorder are lower than the ratio for co-morbid anxiety and depression.

Although support for parts of Ochoa's hypothesis was garnered from the some of the studies cited above, the following studies provide strong counter-evidence. An early longitudinal study done in Sweden, called the Lundby study, covered a 25-year period from 1947 through 1972 (Hagnell and Gräsbeck, 1990). Although the data were collected by a clinician using a semi-structured interview, the criteria for classification into the diagnostic categories were determined by the researchers. The criteria for depression were similar to those for MDE and the criteria for anxiety were similar to those for PD and GAD. Co-morbidity was defined by the presence of 'other' psychiatric symptoms, not restricted to depressive and anxious symptoms. Lifetime prevalence rates for pure depression and anxiety, and lifetime rates for co-morbid depression or anxiety were almost twice as high for women as they were for men.

The National Institute of Mental Health Epidemiologic Catchment Area Study (NIMH-ECA) was conducted in the United States to evaluate both community and institutionalized participants in several geographic regions of the US (Regier et al., 1990). Interviews were conducted at 1 year intervals and information was gathered for the past 2 weeks and for the lifetime. DSM-III criteria, but not the exclusionary rules, were used for diagnosis. Women were twice as likely as men to experience major depression, 'any anxiety disorder' (includes PD, simple phobia, and OCD), and 'any anxiety disorder' combined with 'any affective diorder' (including major depression, dysthymia, and bipolar illness).

The National Comorbidity Survey (NCS), assessed a large, community sample drawn from 48 states across the US (Blazer et al., 1994). Lifetime diagnoses of major depressive disorder, generalized anxiety disorder, panic disorder, phobia, substance abuse or dependence, manic episode, or nonaffective psychosis were determined by DSM-III-R criteria from information gathered in a structured interview. Major depressive episode was deemed comorbid when it was diagnosed concurrent with any of the other diagnoses listed above. Women were approximately one and a half times as likely as men to have a diagnosis of major depression alone and they had exactly the same likelihood of experiencing either anxiety alone or co-morbid depression and anxiety.

A re-analysis of these data by Parker and Hadzi-Pavlovic (2001) used participants' retrospective reports about their ages at their first episodes to evaluate the possibility that the emergence of an anxiety disorder precedes that of a depressive disorder. The anxiety disorders considered were social phobia, GAD, panic and/or agoraphobia, considered collectively, and the depressive disorders were major depression and dysthymia. Using survival analysis, the authors demonstrated that the odds of both major depression and dysthymia were more likely when the participant was female and/or had a history of anxiety. However, the interaction of these variables did not significantly increase the odds of developing depression, which indicates that prior anxiety is equally depressogenic for men and women. Thus, being female and having a history of anxiety appear to be independent risk factors for depression.

Contrary to Ochoa and his colleagues' (1992) hypothesis, the three preceding studies consistently found that women are more likely than men to experience pure depression, pure anxiety, and co-morbid anxiety and depression. In addition, it is important to emphasize that the three studies which provided at least partial support for Ochoa et al.'s (1992) hypothesis had the smallest samples from the most restricted geographical regions. One was the city of Zurich, Switzerland (Angst et al., 1997), another a county in Atlantic Canada (Murphy, 1990), and the last the southeast region of Michigan (Breslau et al., 1995). In addition, the Zurich and Michigan studies used participants from a restricted age range (ages 19–20 and 21–30, respectively). In contrast, the three studies that did not support Ochoa et al.'s hypothesis had the largest samples, and two had large regional coverage. The ECA study used participants from both

community and institutionalized settings in five different sites ranging from Connecticut to California (Regier et al., 1990). The NCS study was community-based and gathered data in 48 states (Blazer et al., 1994). Thus, we conclude that there is, to date, little empirical support for Ochoa et al.'s (1992) hypothesis that the gender difference in depression rates is due to gender differences in co-morbid anxiety and depression. This result was found consistently across a number of studies using varying definitions of depression and anxiety as well as varying definitions of comorbidity. However, there are some limits to the generalizability of our conclusion. First, all but one of the studies we reviewed used a community sample. It is possible that different results would be found in clinical samples. Second, all of the studies were conducted in North American or Western countries. Studies replicating the design and scope of the ECA and NCS studies in non-Western countries would provide robust support for the generalizability to other cultures.

All studies showed that women were more likely to experience co-morbid depression and anxiety than were men. However, women also were more likely than men to experience either disorder alone. Women were approximately 1.3–3.3 times as likely as men to experience anxiety disorders alone. Finally, women were always more likely than men to experience depressive disorders alone, but some studies reported almost equal ratios while the ratio in others was approximately double. Thus, if anything, the ratio of women to men who experience anxiety alone or anxiety in combination with depression tends to be higher than the ratio of women to men who experience depression alone. This finding is remarkable in light of the emphasis placed in the literature on the gender difference in rates of depression, while the gender difference in rates of anxiety is neglected. In part, the emphasis on the gender difference in rates of depression may be due to the fact that early reviews of this literature spawned theoretical frameworks to explain the difference (e.g. Weissman and Klerman, 1977). These frameworks then provided the impetus for further research. Research into the gender difference in anxiety also may be served by a similar review and synthesis into an overarching conceptual framework. We also encourage other researchers to investigate gender differences in anxiety, which appear even more pronounced than those in depression, and to explore the co-morbidity of anxiety and depression in an attempt to understand why more women than men experience both disorders.

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