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Abstract

Background: Despite the importance of marriage as a source of social support, it has been largely neglected in studies of bipolar disorder; and differential effects on men and women have not been explored.
Methods: Data on episodes of depression, mania, and mixed states were collected for the previous 2 years from a sample of 282 bipolar individuals using the National Institute of Mental Health Life Chart Methodology.
Results: Effects unique to women included the following: Bipolar women were significantly more likely to be married. Married women had fewer episodes of depression during the past 2 years than never-married women, and the cumulative severity of depression was lower. There were no differences in diagnostic subtype or age of onset between married and never-married women. Among men, never-married men were more likely to have bipolar I disorder and had an earlier age of onset compared with married men. There were no differences between married and never-married men in frequency, duration, or severity of mood episodes.
Conclusions: Partner selection processes as they relate to bipolar disorder may be different for men and women. The bipolar I diagnostic subtype and early age of onset were associated with a lower likelihood of being married for men, but not for women. Marriage was associated with less depression in women during a 2-year period; but marital status was not associated with disease course differences in men, suggesting that women may be more sensitive to the positive effects of social support available within a stable marital relationship.
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1. Introduction

The expression of symptoms of abnormal mood in individuals with bipolar disorder is determined by multiple influences including both biological and environmental factors. The quality of social support, for example, appears to influence both relapse rates and relapse polarity [1,2]. Despite the importance of the marital relationship as a major source of social support, it has been largely neglected in studies of bipolar disorder. Studies tend to focus on how the illness affects the relationship rather than how the relationship affects the illness. For example, epidemiologic studies have found that individuals with bipolar disorder are less likely to be married than those without this diagnosis [3]; and marital function among those who are married is often impaired [4]. Bipolar individuals score lower on scales of marital adjustment [5], have more extramarital sexual experiences [6], and have higher divorce rates [7].

Only limited research has been published on the effects of marriage on the course of bipolar disorder, and the studies have not examined the crucial role of gender. Gender roles in marriage vary from couple to couple and change over time; but in general, the experience of marriage is different for men and women. For example, gender effects in marriage have figured prominently in some general medical conditions. Although married people of both genders tend to enjoy better health compared with unmarried people, the protective effects are stronger for men than for women [8]. A proposed explanation is that women are more likely to attempt to influence their spouse's health-related behaviors. Thus, when marriage promotes healthy lifestyle changes, these effects are relatively larger for men.

If there are gender effects of marriage in bipolar disorder, analyses that combine the results of men and women may produce misleading results. To identify potential differences, 2-year data on the frequency and severity of mood episodes were used to compare married and unmarried individuals in the context of gender.

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2. Materials and methods

2.1. Participants

Participants were recruited via the Internet using advertisements that were displayed with bipolar-related searches. The inclusion criteria required participants to have a diagnosis of bipolar disorder I, II, or not otherwise specified (NOS) based on participant-reported history. Participants were at least 18 years old, never married or currently married, and with access to an Internet-connected computer. After the nature of the procedures was explained, participants gave informed consent to participate in the study. The study was conducted in compliance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) and was approved by the George Washington University institutional review board.

2.2. Data collection and analysis

Participants recorded diagnosis, year of birth, marital status, years of school completed, age of first mood episode, and age of bipolar diagnosis. Data on episodes of depression, mania, and mixed states were collected for the previous 2 years using the National Institute of Mental Health Life Chart Methodology [9] adapted for use over the Internet. As part of the Life Chart Methodology, before charting episodes of abnormal mood, subjects entered information about memorable events related to relationships, jobs, educational programs, and geographic relocation. In addition to being an important part of the life chart, this information was also used to assist in the recall of mood episodes. These events were visible in the appropriate location relative to the month and year as participants entered mood episode data. Associating particular periods of time with highly memorable events has been shown to improve the accuracy of retrospective reports as far back as 3 to 5 years [10].

Mood episodes were analyzed both in terms of frequency and severity. To account for severity, a mild episode was given a value of 1; a moderate episode, 2; and a severe episode, 3. Episodes that required hospitalization were counted as severe and given a score of 3. A total score was calculated separately for manic, mixed, and depressed episodes by summing the scores of all episodes for each polarity during the 2-year period. Of note, a mood episode as defined by the National Institute of Mental Health Life Chart Manual is different from an episode defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision*. A mild episode, for example, is described as causing "little or no impairment in functioning," which would exclude a *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* episode.

Mean values of continuous variables were compared using 2-tailed independent-samples t test, and χ^2 was used for categorical data. Partial correlation with appropriate covariates was used to evaluate the likelihood of being married while controlling for age, and the relationship between marriage and mood episodes while controlling for diagnostic subtype. Because of the exploratory, hypothesis-generating nature of the study, nominal P values are reported without correction for multiple comparisons.

3. Results

3.1. Gender differences

Between June 2007 and September 2008, 282 subjects were enrolled in the study and completed retrospective life charts. Most participants were women, comprising 75% of the sample. The diagnostic distribution between men and women was significantly different. Among men, the most common diagnosis was bipolar I; and among women, it was bipolar II (Table 1).

There were few demographic or clinical differences between men and women (Table 2). Women in this study were significantly more likely than men to be married and completed fewer years of school. Men reported more manic/hypomanic episodes and had higher mania/hypomania total scores. There were no differences in age, age of illness onset, episodes of depression, or hospitalizations.

3.2. Married vs never married differences by gender

3.2.1. Depressive episodes

Comparisons of married and never-married subjects identified differences between men and women (Table 3). As would be expected, both men and women who had never been married were younger than those who were married. No significant differences were seen among either gender groups for manic episodes or mixed episodes; however, married women with bipolar disorder reported significantly fewer episodes of depression compared with never-married women, and their mean total depression score was lower.

3.2.2. Age of onset, age of diagnosis, and bipolar subtypes

The average duration of time between the first episode and diagnosis was 12.9 years (SD = 9.7), ranging from 0 to 48 years. The difference between men (12.5, SD = 10.8) and women (13.0, SD = 9.3) was not significant. There was a strong negative correlation between birth year and the number of years separating the age of first episode and the age of diagnosis ($r = -.522$, $P < .001$). Over time, the date of diagnosis became closer to the date of first episode in this sample, a finding that was also observed in the National Ambulatory Medical Care Survey [11].

Table 1
Comparison of diagnoses for male and female patients ($\chi^2 = 14.559$, $df = 2$, $P < .001$)

Diagnosis	All (N = 282)	Male (n = 71)	Female (n = 211)
Bipolar I	87 (31%)	31 (44%)	56 (26%)
Bipolar II	117 (41%)	16 (22%)	101 (48%)
Bipolar NOS	78 (28%)	24 (34%)	54 (26%)

Table 2
Demographic and clinical characteristics of male and female patients

	Male	Female	P
Married	28 (39%)	112 (53%)	.047
Years of school	13.1 (3.5)	11.7 (2.9)	.03
Manic/hypomanic episodes	5.9 (6.9)	4.0 (4.8)	.04
Mania/hypomania score	11.6 (15.5)	6.7 (8.1)	.01
Age	33.9 (15.6)	33.5 (11.3)	NS
Age of first episode	16.2 (7.3)	15.4 (7.1)	NS
Age of diagnosis	26.8 (12.0)	28.2 (10.2)	NS
Total episodes charted	13.0 (7.9)	11.7 (7.9)	NS
Depressive episodes	8.2 (7.1)	8.1 (6.8)	NS
Mixed episodes	2.2 (4.4)	1.9 (3.5)	NS
Depression score	16.8 (17.6)	15.0 (13.2)	NS
Mixed score	5.0 (10.1)	4.1 (7.8)	NS
Depression hospitalizations	0.45 (2.2)	0.27 (0.66)	NS
Mania/mixed hospitalizations	0.85 (3.1)	0.23 (0.61)	NS

The married values are the number in each group with the percentage in parentheses. All other values are the mean with the standard deviation in parentheses. NS indicates not significant.

Controlling for date of birth, the likelihood of being married for men was significantly associated with both the age of onset of bipolar disorder ($r = .297$, $P = .012$) and the age of initial diagnosis ($r = .543$, $P < .001$). The earlier the age of onset, the less likely the bipolar man was to be married. Women's marital status, however, showed no correlation with either of these variables.

Similarly, the diagnostic distribution was essentially the same for married and never-married women (Table 4). Among men, however, there was a preponderance of bipolar I among the never-married participants and a preponderance of bipolar II among the married ones ($\chi^2 = 4.908$, $df = 1$, $P = .027$).

When the effect of bipolar subtype was held constant, the relationship between currently being married and having less depression remained significant for women and nonsignificant for men. Similarly, the absence of significant relationships between marital status and mania for both men and women was unchanged in this analysis.

Table 4
Diagnostic distribution by marital status for men and women

Diagnosis	Male		Female	
	Never married	Married	Never married	Married
	n = 43	n = 28	n = 99	n = 112
Bipolar I	22	9	27	29
Bipolar II	6	10	46	55
Bipolar NOS	15	9	26	28

4. Discussion

This is the first study to explore how gender differences affect the clinical correlates of marriage in individuals with bipolar disorder. Two main findings emerged. The first related to the likelihood of being married. Women in this study were significantly more likely to be married than men (53% vs 39%); and unlike men, the likelihood of a woman being married was unaffected by age of onset or bipolar subtype.

Earlier age of onset has been linked to greater severity of clinical symptoms in bipolar disorder, including higher rates of psychosis, chronicity, and comorbidity [12-14]. In this study, early age of onset was negatively correlated with the likelihood of being married in men, but not in women. Similarly, men with the bipolar I subtype, characterized by more severe symptoms of mania, were less likely to be married than those with bipolar II, which is generally associated with more chronic symptoms of depression. Among married and unmarried women, the subtype distribution was approximately the same.

One explanation for these differences is that the nature and severity of bipolar symptoms play a larger role in partner selection processes for women than for men. The symptoms of bipolar disorder in women may carry less weight with potential male marriage partners or may not be well identified by men; or the effects of differing levels of bipolar severity may be washed out by other partner selection factors

Table 3
Married patients compared with never-married patients analyzed separately by gender

	Male			Female		
	Never married	Married	P	Never married	Married	P
Age	27.4 (14.9)	43.8 (10.8)	<.001	27.1 (8.8)	39.2 (10.2)	<.001
Age of first episode	13.6 (5.9)	20.2 (7.6)	<.001	14.5 (6.2)	16.3 (7.8)	NS
Age of diagnosis	20.1 (6.7)	37.4 (11.2)	<.001	23.4 (7.9)	32.5 (10.0)	<.001
Years of school	12.6 (3.6)	14.0 (3.3)	NS	13.6 (3.0)	14.7 (2.7)	.004
Total episodes charted	13.5 (7.7)	12.3 (8.4)	NS	12.7 (8.4)	10.8 (7.4)	NS
Depressive episodes	7.6 (6.6)	9.1 (7.9)	NS	9.1 (7.3)	7.1 (6.1)	.03
Manic/hypomanic episodes	6.2 (6.8)	5.5 (7.2)	NS	4.6 (5.5)	3.6 (3.9)	NS
Mixed episodes	2.0 (3.6)	2.6 (5.4)	NS	1.6 (2.8)	2.2 (4.0)	NS
Depression score	15.2 (15.7)	19.1 (20.2)	NS	17.3 (14.5)	13.0 (11.7)	.02
Mania/hypomania score	12.0 (14.8)	10.9 (16.7)	NS	7.7 (9.4)	5.9 (6.7)	NS
Mixed score	4.9 (9.7)	5.2 (11.0)	NS	3.5 (6.1)	4.6 (9.0)	NS
Depression hospitalizations	0.70 (2.8)	0.07 (0.38)	NS	0.34 (0.70)	0.21 (0.61)	NS
Mania/mixed hospitalizations	1.2 (3.9)	0.32 (0.90)	NS	0.23 (0.62)	0.22 (0.60)	NS

Values are the mean with the standard deviation in parentheses.

that are given a higher priority by men, such as similarity on attitude-related domains [15]. Women, compared with men, tend to focus more on what goes on in intimate relationships, to think more about relationships [16], and to pay more attention to the internal dynamics of the relationship after it has been established [17]. By contrast, in their relationships with intimate partners, men are less sensitive to personality differences [15] and may have less ability to recognize different emotional states compared with women [18]. In a study of recognition of facial emotional expressions, women had a higher rate of correct classification, whereas men were more likely to have difficulty distinguishing one emotion from another [19].

The finding of an association of diagnostic subtype (bipolar I vs bipolar II) with marital status in men but not in women may be related to gender differences in manic symptomatology. Men with bipolar I disorder are more likely than women to have substance abuse comorbidity [20], and one study found that men were more likely than women to report unspecified "behavioral problems" during periods of mania [21]. An older report describing the sexual behavior of 24 manic patients found that women were more sexually provocative and seductive than men. However, women and men were equally likely to have increased sexual desire and increased frequency of sexual relationships [22].

The second finding was that married women reported significantly less frequent and less severe episodes of depression than their never-married counterparts, but there were no differences in episode frequency or severity between married and never-married men. Greater risk of recurrence among never-married individuals has been found in other bipolar populations. A case registry study in Denmark found that following their first mood episode, never-married bipolar individuals had a risk of recurrence that was 3.15 times greater than individuals who were married, divorced, or widowed [23]. Results for men and women were not reported separately.

It is not clear why less depression was reported by married women but not by married men in the current study. Other studies have found that the beneficial effects of marriage on health are stronger for men than for women. Much of the existing literature, however, involves general medical conditions such as hypertension; and the effects of marriage are thought to be mediated by changes in lifestyle [8]. In psychiatric conditions, on the other hand, social support may play a greater role; and social support is more relevant to mood state for women than for men. In major depressive disorder, for example, women are more sensitive to the depressogenic affects of having low levels of social support than men [24]. Because women appear to be more attuned to what goes on in intimate relationships, ongoing interactions in a marriage may have a greater influence on perceived social support for wives than for husbands [17].

Unlike depression, the frequency and severity of mania did not differ between married and unmarried subjects for either men or women. The finding of a marital effect on depression but not on mania is consistent with work by Johnson and colleagues [1] who found that there was a polarity-specific effect of social support on the longitudinal course of bipolar disorder in which stronger social support influenced depression but not mania. Cohen and colleagues [2] also found that perceived social support from a best friend, parent, and romantic partner independently predicted depressive, but not manic, episode recurrence. In addition, psychosocial interventions such as family therapy and interpersonal and social rhythm therapy tend to be more efficacious in the treatment and prevention of depression relative to mania [25].

These considerations assume that the participants in this study had supportive marriages despite the increased risk for marital problems that exists when one partner has bipolar disorder. Spouses of bipolar patients tend to report more negative characteristics in their marriage, lower marital satisfaction, and more negative traits in their partners compared with spouses of healthy controls [26]. The experience of the bipolar patients, however, can be different from the experience of the spouses. In a small study of 19 bipolar patients and their well spouses, 53% of the well spouses said that they would not have married if they knew more about bipolar disorder compared with only 5% of the bipolar patients [27]. Although the quality of the relationships in the current study was not measured, the results, showing less depression in women and no increased mood pathology in either group, suggest that overall the marriages were experienced positively by these study participants.

There may have been a selection bias for supportive marriages in this study. Because the aim of this study was to compare individuals who were in a marriage with those who were not, those who were separated, divorced, or widowed were excluded from the married group. If separated, divorced, and widowed individuals had been grouped with those who were never married to form a larger "unmarried" category, the greater levels of emotional stress associated with separation, divorce, and the death of a spouse could have artificially increased the instability of the unmarried group and distorted the results.

Because this was a retrospective study, it is not possible to make conclusions regarding causality. Married women in the study had fewer and less severe episodes of depression; however, it is not clear if this was a result of a protective effect of marriage or if women less prone to depression were more likely to be married because of lower levels of psychosocial impairment or other forms of disability. The absence of an association between marital status and both age of onset and diagnostic subtype makes the latter explanation less likely and tends to support a protective effect of marriage.

Data collected in this study depended on the accuracy of subjects' memories over a 2-year period. One strategy that was used to improve the accuracy of recall of mood episodes

was to associate particular periods of time with highly memorable events on the chart where moods were recorded. Visual aids of this nature, which are able to contextualize life events, have been shown to improve the validity of retrospective information [10]. Nevertheless, retrospective data are not as reliable as prospective data.

Another potential weakness of the data is that these were collected remotely from subjects using the Internet. Communication efficiencies associated with this medium can make subject recruitment easier, achieve greater geographic diversity, and allow access to populations who would not participate in traditional research studies. At the same time, the actual composition of the sample being studied, particularly in the case of anonymous participants, is difficult to know. Subjects working in a nonclinic or nonlaboratory environment might invest less time and energy in accurately completing questionnaires [28]. Despite these potential problems, a high degree of reliability and validity has been seen when using the Internet as a source of subject recruitment [29]; and it may even facilitate gathering of sensitive information because of a sense of anonymity [30]. Other limitations include self-reported diagnosis and no measures of medication compliance.

5. Conclusion

Unlike general medical conditions, in which behavioral changes associated with being married confer a preferential benefit on men, marriage appears to be of greater benefit to bipolar women. The benefit found in this study was limited to a reduction of depressive symptoms, but not manic symptoms, hospitalizations, or the total number of episodes. Mental illnesses in general are responsive to varying levels of social support, and women appear to react more strongly to these variations than men do. The interpersonal and social rhythm therapy literature also suggests that women may benefit more from the increased lifestyle regularity that can be seen in stable marriages [31].

Bipolar disorder may have less influence on the likelihood of being married for women than for men. This difference may be the result of potential male spouses placing less weight on bipolar disorder as a selection factor or the illness manifesting itself differently in men and women.

Gender-specific behavior is multidetermined and includes influences from society, culture, family, peers, genetics, and personal choice. The finding that women with bipolar disorder may be more sensitive to the benefits of being married than men may be helpful in understanding bipolar disorder in men and women and in developing effective treatment strategies. Nevertheless, it will ultimately be important to understand the gender-specific interactions between environment and mood with more sophisticated analyses, possibly via genetic, endocrine, cross-cultural, and other study designs.

Acknowledgment

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