Gender and Remission of Mental Illness

Christoph M. Schimmele, MA, Zheng Wu, PhD, Margaret J. Penning, PhD

ABSTRACT

Objectives: There is a well-established association between gender and the prevalence of mental illness. The objective of this study was to determine whether gender also influences the timing of remission from illness. The regression analysis undertaken considered remission in terms of all ICD-9 mental disorders (codes 290-314). This analysis compares males and females on average length of treatment for mental illness and examines whether any gender differences in remission are generalized or disorder specific.

Methods: The statistical analysis was based on longitudinal (1990-2001) administrative data on 5,118 females and 2,470 males. The target population represented all individuals with an ICD-9 diagnosis of mental illness who were treated through the Medical Services Plan in British Columbia. The regression analysis used the generalized estimating equations method to model differences in length of treatment.

Results: There was a non-significant bivariate relation between gender and the timing of remission from mental illness. However, the multivariate findings demonstrated that a significant gender effect on remission emerges after controls were introduced for demographic and socio-economic characteristics. In particular, the timing of remission was somewhat longer for females. This effect was generalized and not restricted to specific illnesses.

Conclusions: The emergence of a significant effect after considering demographic and socio-economic characteristics suggests that a social disadvantage within the male sample (more single males) was suppressing a small negative effect of female gender on the timing of remission. In other words, a social disadvantage among males concealed an unexplained female disadvantage in remission.

Key words: Gender; remission; mental health

La traduction du résumé se trouve à la fin de l'article.

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Gender differences in the prevalence of mental illness are well documented,¹⁻⁶ but whether gender also influences the timing of remission is unclear. Do the factors that contribute to a higher prevalence of illness among females also translate into a gender gap in the remission of illness? There is a good rationale to anticipate that gender is a factor in remission. For example, the literature suggests that gender dissimilarities in response to depression could lead to differences in the alleviation, complication or persistence of symptoms.⁷⁻¹³ In addition, gender differences in the clinical features of illness could also influence remission. Yet, the literature provides inconsistent conclusions and largely focuses on mood disorders.

One group of studies argues that gender has a non-significant effect on remission. For example, Benedetti et al.¹⁴ investigated whether gender influences the course of bipolar disorder. Their research showed that gender is non-significant in terms of the reduction of symptoms and number of recurrences of bipolar disorder. Benedetti et al. remarked that the effect of gender observed in other studies could be a result of ignoring dissimilarities in medical treatment. However, gender does not moderate the effect of pharmacological treatment for depression, according to Grubbe Hildebrandt et al.¹⁵ Their research demonstrates that, given equivalent therapies, gender is a non-significant factor in the post-treatment outcomes of depression.

Other studies indicate that gender has a significant effect.⁷⁻¹³ Riise and Lund¹³ demonstrated that depressed females have a higher risk of depression at long-term follow-up. The authors observed that the risk of chronic depression among females increased after baseline level of illness had been adjusted for. Riise and Lund's findings could reflect a higher rate of relapse among females, not a lower remission rate, but they at least demonstrated that depression is a more persistent condition for females and that gender can influence long-term prognosis. Other studies confirm that females experience higher rates of chronic depression and relapse.⁹⁻¹¹

Bland et al.¹⁶ examined remission of several psychiatric disorders in a Canadian population and observed potential gender patterns that warrant the present research. However, their attention was directed toward age patterns of remission, and their analysis did not report whether there were statistically significant differences in gender patterns of remission. That said, Bland et al. presented some interesting gender-specific findings in 1-year remission rates. Their cross-tabulations suggest that there could be a female disadvantage. In general, about 26% of females achieve remission within 1 year, in contrast with 40% of males. Bland et al. also suggested that this female disadvantage is loaded on specific illnesses rather than representing a generalized effect.

The present research examines the effect of gender on the timing of remission (length of medical treatment) for mental illness. The analysis considers remission of a wide spectrum of mental disorders. Almost all previous studies have focused on a particular disorder or class of disorders, and most targeted depression. Hence, this research is an improvement on previous studies because it considers the general and disorder-specific effects of gender on remission and controls for the effects of comorbid conditions. Another limitation of previous studies is the reliance on data from a particular source (e.g., a specific psychiatric practice). Our data represent an entire population under treatment for a clinical mental illness in British Columbia. These data reduce the influence of potential site-specific biases, because they consist of hundreds of different treatment sites and service providers.

Authors' Affiliation

Department of Sociology, University of Victoria, BC

Correspondence and reprint requests: Christoph M. Schimmele, P.O. Box 3050 STN CSC, Cornett A333, 3800 Finnerty Rd., Victoria, BC V8W 3P5, E-mail: chrissch@uvic.ca.

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METHODS

Sample

Our analysis used longitudinal data from the British Columbia Linked Health Database (BCLHD), which includes datasets on physician and specialist visits, hospitalizations and hospital separations, and tertiary and extended care.¹⁷ The datasets are linked to Medical Service Plan (MSP) records. The MSP is a single-payer medical insurance plan that conforms with the *Canada Health Act*, guaranteeing universal and comprehensive medical coverage for all “medically necessary” hospitalizations, outpatient treatments and extended care. About 95% of BC residents are enrolled in the MSP.¹⁸ Persons with a diagnosis of a clinical mental illness (ICD-9 diagnostic codes 290-314) are eligible to receive public direct health care, as provided through provincial/regional agencies, private practitioners and hospitals. The MSP does not offer comprehensive coverage for milder conditions (e.g., sub-syndromal depression), but general practitioners often treat these, and such treatment is also an MSP-billable service.

The target population was all BC residents aged 18 and older who started treatment for an ICD-9 diagnosis of mental illness in 1990. The study followed a 10% random sample of these patients from 1990 to 2001. It excluded cases missing core variables (e.g., care episode and gender). The final study sample consisted of 5,118 female and 2,470 male patients, and a total of 10,137 care episodes (cases). These cases were complete for patients with admission dates in 1990 and discharge dates before or in 2001. The information for ongoing (censored) cases was unavailable.

Variables

Our dependent variable was length of treatment for a mental illness. It was time-invariant at the episode level but time-variant at the individual level when the respondent experienced multiple, non-concurrent care episodes (separate cases) during the period of observation. A “care episode” refers to MSP-billable contact with a health care professional, and it represents the formal diagnosis of illness and commencement of treatment. We subtracted the date of discontinuation of treatment from the date of first contact to measure the timing of remission (symptom resolution) in terms of days of treatment.

For our purposes, a psychiatrist grouped the numerous specific diagnoses of mental illness contained in BCLHD data into nine distinct classes of illness: 1) alcohol/substance abuse, 2) delirium, 3) psychoses, 4) mood disorders, 5) anxiety disorders, 6) adjustment disorders, 7) dementia, 8) conditions needing counseling (e.g., bereavement, relationship difficulties, school-related problems) and 9) other disorders (e.g., sexual disorders, sleep disorders, pain disorders). This categorical variable was introduced to control for the effect of type of illness and the effect of comorbid illness on the timing of remission. Table 1 presents the definitions and descriptive statistics for all selected variables.

The regression models included controls for several other control variables. The analysis controlled for age, marital status, Aboriginal status, geographic location and socio-economic status, which have well-established effects on the prevalence of mental illness, remission of illness and access to services.^{5,16,19,20}

Statistical model

The generalized estimating equations (GEE) method (marginal models) was used to estimate average group-level (male-female) differences in length of treatment. Length of treatment was measured as

a discrete count variable (days of treatment), which was assumed to follow the Poisson distribution. Because care episodes at the patient level are sequential, we treated them as repeated measurements in the longitudinal design. The GEE method is well suited for analyzing repeated measurements.^{21,22} The GEE model allows the number and spacing of the repeated measurements to vary among individuals. It assumes that observations for each individual are correlated, though observations among individuals are assumed to be independent. We assumed that the correlation is constant (exchangeable) between any two observation times and used an exchangeable correlation model. The GEE models were estimated using the GENMOD procedure in SAS (Statistical Analysis System) version 9.1.

RESULTS

Table 1 presents a bivariate examination of gender differences in remission from mental illness. Length of treatment (symptom resolution) serves as a proxy for remission. These initial results illustrate an important and encouraging finding: gender appears to be a non-significant factor in remission from mental illness in general. The average length of treatment is about 208 days for females and 203 days for males, a small but non-significant difference in the timing of remission. This finding implies that gender disparities in mental illness do not complicate treatment or prolong remission. Hence, even though gender still could influence responses to mental illness, this does not seem to have an effect on the duration of illness.

Table 1 also illustrates the gender-specific frequencies of the types of mental illnesses that were treated. In general, mood disorders accounted for a large proportion of all treatment received and represented the most prevalent illness in this respect. About 24% of females and 21% of males were treated for a mood disorder. This represents a significant difference at the $p < 0.001$ level. There are similar gender differences in the treatment of anxiety and adjustment disorders. About 13% of females and 7% of males were treated for an anxiety disorder, and 17% of females and 13% of males were treated for an adjustment disorder. Again, these differences are significant at the 0.001 level. There are also significant gender differences in the treatment of alcohol/substance dependencies, psychoses, delirium and dementia, as a higher proportion of males than females were treated for these illnesses.

As Table 2 suggests, gender differences in remission could depend on the type of illness. The average length of treatment for mood disorders was 264 days for females and 223 days for males, a difference of about 6 additional weeks of treatment for females. The length of treatment for females also appears to be longer for anxiety disorders (18 additional days), adjustment disorders (45 additional days) and other illnesses. These findings warrant concern, and the objective of the subsequent regression analysis was to determine whether the differences contributed to significant overall or illness-specific gender differences in the timing of remission.

Table 3 presents GEE results for the effects of gender and other selected variables on remission. Model 1 considers the effect of gender alone. There was no gender difference according to this model, which indicates that, on average, the timing of remission is not longer for females than for males. In consideration of the gender differences in length of treatment shown in Table 2, Model 2 estimates the effect of type of illness on remission and controls for comorbidities. In comparison with counseling-needed conditions, all illnesses except addictions showed increased length of treat-

Table 1. Definitions and Gender Differences in the Variables Used in the Analysis: Canadian Adults (Age 18+), 1990

Variable	Definition	Females	Males	p value*
Care episode in days	Length of treatment in days (range 0-4,178 days)	207.6	202.5	0.576
Type of illness				
Alcohol/substance	Dummy indicator (1 = yes, 0 = no)	2.4%	7.0%	<0.001
Delirium	Dummy indicator (1 = yes, 0 = no)	3.6%	5.8%	<0.001
Psychoses	Dummy indicator (1 = yes, 0 = no)	4.1%	8.3%	<0.001
Mood disorders	Dummy indicator (1 = yes, 0 = no)	24.0%	20.6%	0.001
Anxiety disorders	Dummy indicator (1 = yes, 0 = no)	12.5%	7.4%	<0.001
Adjustment disorders	Dummy indicator (1 = yes, 0 = no)	16.5%	12.8%	<0.001
Dementia	Dummy indicator (1 = yes, 0 = no)	5.1%	6.4%	0.019
Other conditions	Dummy indicator (1 = yes, 0 = no)	16.0%	17.5%	0.089
Counseling-needed conditions	Reference group	15.9%	14.2%	0.064
Age	Age at diagnosis (range 18-105)	47.44	49.48	<0.001
Marital status				
Single	Dummy indicator (1 = yes, 0 = no)	17.9%	28.8%	<0.001
Separated/divorced	Dummy indicator (1 = yes, 0 = no)	23.3%	20.6%	0.009
Widowed	Dummy indicator (1 = yes, 0 = no)	16.2%	8.2%	<0.001
Married/cohabiting	Reference group	42.7%	42.4%	0.828
Aboriginal	Dummy indicator (1 = yes, 0 = no)	3.8%	3.7%	0.954
Rurality				
Urban fringe	Dummy indicator (1 = yes, 0 = no)	3.7%	3.9%	0.807
Rural fringe	Dummy indicator (1 = yes, 0 = no)	7.0%	7.0%	0.962
Urban areas outside CMAs/CAs†	Dummy indicator (1 = yes, 0 = no)	15.5%	17.4%	0.038
Rural areas outside CMAs/CAs†	Dummy indicator (1 = yes, 0 = no)	9.8%	10.2%	0.572
Urban core	Reference group	63.9%	61.5%	0.040
Work outside home	Dummy indicator (1 = employed full/part time, 0 = otherwise)	28.8%	29.2%	0.673
Household income	Household income in decile (range: 1-10)	4.98	5.04	0.359
N		5,118	2,470	

* p values are obtained from bivariate logit models of gender and each of the explanatory variables.

† CMA, census metropolitan area; CA, census agglomeration

Table 2. Average Length of Treatment (in Days) by Type of Illness and Gender: Canadian Adults (Age 18+), 1990*

Type of Illness	Females		Males	
	Mean	SD	Mean	SD
Alcohol/substance	141.9	262.4	107.0	210.6
Delirium	185.3	275.4	218.4	315.1
Psychoses	571.3	722.8	558.2	810.1
Mood disorders	264.0	424.5	223.1	342.6
Anxiety disorders	205.6	337.9	187.5	293.0
Adjustment disorders	174.9	310.3	129.3	212.4
Dementia	237.6	299.3	195.8	272.1
Other conditions	145.3	259.6	154.4	281.9
Counseling needed conditions	132.1	272.4	141.7	342.7
N	5,118		2,470	

* Self-weighted data

ment. However, type of illness is a non-significant factor in terms of gender differences in the timing of remission. Model 3 introduces demographic and socio-economic variables to those considered previously. A modest but significant ($p < 0.001$) gender difference emerges in this model, which demonstrates that gender is indeed a determinant of remission, net of demographic and socio-economic characteristics.

Table 4 explores whether there are gender differences in remission in terms of specific types of illness. Although we observed a small general difference in the timing of remission between females and males, this aggregated analysis could mask important gender differences in remission from specific illness. As Table 4 shows, however, the general pattern observed in Table 3 is accurate. There are no gender differences in the timing of remission of specific illnesses, and it is only in cumulative terms that a gender difference in remission is observable.

CONCLUSION

This study examined gender differences in remission from a spectrum of mental illnesses. The analysis indicates that more females received treatment for an illness than males. This higher rate of treatment could correspond to a greater need among females, but

Table 3. Generalized Estimating Equations for Effect of Gender and Selected Explanatory Variables on Length of Treatment, by Model: Canadian Adults (Age 18+), 1990-2001

Variable	Model 1	Model 2	Model 3
Female (1 = yes)	-0.003	0.060	0.124***
Type of illness			
Alcohol/substance	—	-0.025	-0.045
Delirium	—	0.368***	0.274***
Psychoses	—	1.297***	1.144***
Mood disorders	—	0.647***	0.618***
Anxiety disorders	—	0.389***	0.399***
Adjustment disorders	—	0.188**	0.236***
Dementia	—	0.450***	0.360***
Other conditions	—	0.080	0.078
Counseling-needed conditions†	—	—	—
Age	—	—	0.038***
Age square ($\times 100$)	—	—	-0.030***
Marital status	—	—	—
Single	—	—	0.382***
Separated/divorced	—	—	-0.072
Widowed	—	—	-0.057
Married/cohabiting†	—	—	—
Aboriginal (1 = yes)	—	—	-0.223*
Rurality	—	—	—
Urban fringe	—	—	0.070
Rural fringe	—	—	-0.016
Urban areas outside CMAs/CAs‡	—	—	0.089
Rural areas outside CMAs/CAs‡	—	—	-0.114*
Urban core†	—	—	—
Work outside home (1 = yes)	—	—	-0.168***
Household income	—	—	-0.025***
Intercept	5.317***	4.846***	3.911***
Log likelihood	10778255	10778496	10778579
Δ Log likelihood		240.7***	83.4***
d.f.	—	8	12

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed test)

† Reference category

‡ CMA, census metropolitan area; CA, census agglomeration

it could also involve an underutilization of service among males. A greater proportion of females received treatment for mood disorders, anxiety disorders and adjustment disorders. A greater proportion of males received treatment for addictions, delirium and psychoses. There are also gender differences in average length of treatment for each type of illness considered. In several instances, females appear to need a longer course of treatment. Although our

Table 4. Generalized Estimating Equations of Effect of Selected Explanatory Variables on Length of Treatment, by Gender: Canadian Adults (Age 18+), 1990-2001

Variable	Females	Males	p value
Type of illness			
Alcohol/substance	-0.006	-0.085	0.716
Delirium	0.231*	0.293	0.757
Psychoses	1.149***	1.080***	0.689
Mood disorders	0.662***	0.539***	0.364
Anxiety disorders	0.429***	0.349*	0.616
Adjustment disorders	0.306***	0.070	0.112
Dementia	0.446***	0.206	0.204
Other conditions	0.102	0.008	0.530
Counseling-needed conditions†			
Age	0.044***	0.026**	0.110
Age square (× 100)	0.000***	0.000*	0.157
Marital status			
Single	0.358***	0.384***	0.821
Separated/divorced	-0.020	-0.219**	0.047
Widowed	-0.024	-0.092	0.614
Married/cohabiting†			
Aboriginal (1 = yes)	-0.153	-0.413*	0.232
Rurality			
Urban fringe	0.077	0.046	0.864
Rural fringe	-0.136	0.211	0.030
Urban areas outside CMAs/CAs‡	0.082	0.107	0.803
Rural areas outside CMAs/CAs‡	-0.077	-0.193*	0.330
Urban core†			
Work outside home (1 = yes)	-0.116*	-0.257***	0.118
Household income	-0.023**	-0.029**	0.683
Intercept	3.832***	4.318***	0.107
Log likelihood	7279438	3499159	

* p<0.05, **p<0.01, *** p<0.001 (two-tailed test)

† Reference category

‡ CMA, census metropolitan area; CA, census agglomeration

regression analysis confirms that the timing of remission is somewhat longer for females it provides no clear explanation for this finding. However, a possible candidate is marital status, for there are a disproportionate number of single (never married) males in our sample. Prior research demonstrates that singlehood represents a remission disadvantage.²³ To test this conjecture (unreported analysis), we removed marital status from Model 3 in Table III. As anticipated, gender becomes non-significant in the revised model ($p=0.10$), suggesting that this demographic characteristic (more single males) suppresses a slight comparative disadvantage in remission among females. These conclusions are limited inasmuch as these data include only individuals treated for serious clinical illnesses and thus may not be generalizable to less severe disorders.

REFERENCES

- Carter-Snell C, Hegadoren K. Stress disorders and gender: Implications for theory and research. *Can J Nurs Res* 2003;35:34-55.
- Denton M, Prus S, Walters V. Gender differences in health: A Canadian study of the psychosocial, structural, and behavioural determinants of health. *Soc Sci Med* 2004;58:2585-600.
- Linzer M, Spitzer R, Kroenke K, Williams JB, Hahn S, Brody G, et al. Gender, quality of life, and mental disorders in primary care: Results from the PRIME-MD study. *Am J Med* 1996;101:526-33.
- Hopcroft RL, Burr-Bradley D. The sex difference in depression across 29 countries. *Soc Forces* 2007;85:1484-507.
- Health Canada. A Report on Mental Illness in Canada. Ottawa, ON: Health Canada, 2002.
- Romans SE, Tyas J, Cohen MM, Silverstone T. Gender differences in the symptoms of major depressive disorder. *J Nerv Ment Dis* 2007;195:905-11.
- Enns MW, Cox BJ. Psychosocial and clinical predictors of symptom persistence vs remission in major depressive disorder. *Can J Psychiatry* 2005;50:769-77.
- Frank E, Rucci P, Katon W, Barrett J, Williams JW Jr., Oxman T, et al. Correlates of remission in primary care patients treated for minor depression. *Gen Hosp Psychiatry* 2002; 24:12-19.
- Kessler R, McGonagle K, Swartz M, Blazer D, Nelson C. Sex and depression in the National Comorbidity Survey. I: Lifetime prevalence, chronicity, and recurrence. *J Affect Disord* 1993;29:85-96.
- Kornstein S. The evaluation and management of depression in women across the life span. *J Clin Psychiatry* 2001;62:11-17.

- Kuehner C. Gender differences in the short-term course of unipolar depression in a follow-up sample of depressed inpatients. *J Affect Disord* 1999;56:127-39.
- Oldehinkel AJ, Ormel J, Neeleman J. Predictors of time to remission from depression in primary care patients: Do some people benefit more from positive life change than others? *J Abnorm Psychol* 2000;109:299-307.
- Riise T, Lund A. Prognostic factors in major depression: A long-term follow-up study of 323 patients. *J Affect Disord* 2001;65:297-306.
- Benedetti A, Fagioli A, Casamassima F, Mian MS, Adamovitz A, Musetti L, et al. Gender differences in bipolar disorder type I: A 48-week prospective follow-up of 72 patients treated in an Italian tertiary care center. *J Nerv Ment Dis* 2007;195:93-96.
- Hildebrandt MG, Steyerberg EW, Stage KB, Passchier J, Kragh-Soerensen P. Are gender differences important for the clinical effects of antidepressants? *Am J Psychiatry* 2003;160:1643-50.
- Bland RC, Newman SC, Orn H. Age and remission of psychiatric disorders. *Can J Psychiatry* 1997;42:722-29.
- Chamberlayne R, Green B, Barer ML, Hertzman C, Lawrence WJ, Sheps SB. Creating a population-based linked health database: A new resource for health services research. *Can J Public Health* 1998;89:270-73.
- Michalak EE, Goldner EM, Jones W, Oetter HM, Lam RW. The management of depression in primary care: Current state and a new team approach. *BC Med J* 2002;44:408-11.
- Kirmayer LJ, Gill K, Ternar Y, Boothroyd Quesney C, Smith A, Ferrara N, Hayton B. Emerging Trends in Research on Mental Health among Canadian Aboriginal Peoples. A report prepared for the Royal Commission on Aboriginal Peoples. Ottawa, ON: Government of Canada, 1994.
- Maddess R. Mental health care in rural British Columbia. *BC Med J* 2006;48:172-73.
- Diggle PJ, Heagerty K, Liang S, Zeger L. *The Analysis of Longitudinal Data*. Oxford: Oxford University Press, 2002.
- Liang K, Zeger SL. Longitudinal data analysis using generalized linear models. *Biometrika* 1986;73:13-22.
- Wu Z, Penning MJ, Zheng C, Schimmele CM. Marital status and mental health convalescence. Paper presented at the American Sociological Association Annual Meeting; August 11-14, 2007, New York.

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RÉSUMÉ

Objectifs : Il existe un lien confirmé entre le sexe et la prévalence des maladies mentales. Nous avons cherché à déterminer si le sexe influençait aussi le moment des rémissions de ce genre de maladies. Au moyen d'une analyse de régression, nous avons étudié les rémissions de tous les troubles mentaux énumérés dans la CIM-9 (codes 290 à 314). L'analyse comparait la durée moyenne des traitements pour maladie mentale chez les hommes et les femmes afin de déceler d'éventuels écarts entre les sexes dans les rémissions et de déterminer si ces écarts étaient généralisés ou propres à certains troubles.

Méthode : Notre analyse statistique était fondée sur les données administratives longitudinales (1990-2001) de 5 118 femmes et de 2 470 hommes. La population cible englobait toutes les personnes présentant un diagnostic de maladie mentale selon la CIM-9 qui avaient été traitées par le régime de santé de la Colombie-Britannique. Dans l'analyse de régression, nous avons utilisé la méthode des équations d'estimation généralisées pour modéliser les écarts dans la durée des traitements.

Résultats : Nous observons une relation bivariable non significative entre le sexe et le moment des rémissions des maladies mentales. Cependant, les résultats de l'analyse multivariable montrent l'émergence d'un effet sexospécifique significatif après l'introduction de variables de contrôle démographiques et socioéconomiques. En particulier, les rémissions sont un peu plus tardives chez les femmes. Cet effet est généralisé : il ne se limite pas à certaines maladies.

Conclusion : L'émergence d'un effet significatif lorsqu'on tient compte de variables démographiques et socioéconomiques donne à penser que l'existence d'un désavantage social dans l'échantillon masculin (composé de plus de célibataires) a annulé un léger effet néfaste dans le moment des rémissions chez les femmes. Autrement dit, un désavantage social chez les hommes masquait un désavantage inexpliqué sur le plan des rémissions chez les femmes.

Mots clés : sexospécificité; rémission; santé mentale