

Women's status and depressive symptoms: A multilevel analysis

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Available online 11 June 2004

Abstract

The effects of state-level women's status and autonomy on individual-level women's depressive symptoms were examined. We conducted a multi-level analysis of the 1991 longitudinal follow up of the 1988 National Maternal Infant Health Survey (NMIHS), with 7789 women nested within the fifty American states. State-level women's status was assessed by four composite indices measuring women's political participation, economic autonomy, employment & earnings, and reproductive rights. The main outcome measure was symptoms of depression (Center for Epidemiologic Studies Depression Scale, CES-D). The participants were a nationally representative stratified random sample of women in the USA aged between 17 and 40 years old who gave birth to live babies in 1988, were successfully contacted again in 1991 and provided complete information on depressive symptoms. Women who were younger, non-white, not currently married, less educated or had lower household income tended to report higher levels of depressive symptoms. Compared with states ranking low on the employment & earnings index, women residing in states that were high on the same index scored 0.85 points lower on the CES-D ($p < 0.01$). Women who lived in states that were high on the economic autonomy index scored 0.83 points lower in depressive symptoms ($p < 0.01$), compared with women who lived in states low on the same index. Finally, women who resided in states with high reproductive rights scored 0.62 points lower on the CES-D ($p < 0.05$) compared with women who lived in states with lower reproductive rights. Gender inequality appears to contribute to depressive symptoms in women.

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Keywords: Women's status; Gender inequality; Depressive symptoms; Multilevel analysis

Introduction

The World Health Organization (WHO) ranks depression fourth among health problems that contribute to the global burden of disease (World Health Organization, 2001). Epidemiological and clinical studies have consistently shown that depression is two to three times more prevalent among women than men (Horwath & Weissman, 1995). In the Epidemiological Catchments Area Study (ECA), the female to male ratio of the lifetime prevalence of major depression was approximately 2.7:1 and the annual incidence rate ratio

was approximately 1.8:1 in the United States (Horwath & Weissman, 1995). Furthermore, in the US, women are twelve times more likely to take antidepressant medication than men (Rousseau, 2000).

There are several contending theories that seek to explain women's over representation in the prevalence and incidence of depression (Piccinelli & Wilkinson, 2000). Starting from different assumptions about gender/sex differences in health and disease, researchers have employed a variety of "lenses" to examine women's excess of depression (Tesh, 1988; Walsh, Sorenson, & Leonard, 1995). At the most micro level, the "biomedical lens" focuses on genetic differences, sex differences in the dysregulation of neurotransmitters, hormone imbalances and other sex differences in biology (Ussher, 1992;

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Walsh et al., 1995). By contrast, the “psychosocial lens” attributes sex differences to the contribution of psychology, measured by such factors as differential help-seeking behaviors, coping style and self-efficacy.

Moving to a higher level of analysis, the “epidemiological lens” attributes gender differences to the population distribution of risk factors for depression, such as exposure to social isolation, intimate partner violence, and childhood physical and sexual abuse. At the most macro-level of analysis, Walsh et al. propose a “society and health lens” that explores the broader socio-cultural, political and economic processes that shape and determine the distribution of power and resources between men and women, and how these social processes in turn determine gender differences in health (Walsh et al., 1995). Specifically, the society and health lens traces the “social roots”,—such as, gendered social stratification, gendered division of labor and structures of power, that shape and constrain women’s life experiences, behavior and social roles, and, ultimately, their health risks (Connell, 1987; Walsh et al., 1995). Resonating with the recent recognition of the importance of the social context in determining health and disease (Diez-Roux, 1998; Macintyre & Ellaway, 2000), the society and health lens directly points to the gendered social, economic and political arrangements within society in generating gender differences in physical and mental health and offers a useful framework for examining women’s over-representation in depression.

Yllo pioneered research on the relationship of contextual gender inequality and women’s health outcomes (Yllo, 1983). She demonstrated that US states with greater gender inequality had higher rates of violence against women perpetrated by their husbands. Using a similar ecological approach, Kawachi et al. (1999) found that US state-level women’s status as measured by women’s political participation, economic autonomy, employment & earnings, and reproductive rights, was associated with both male and female morbidity and mortality rates (Kawachi et al., 1999).

Turning to research on depression, more attention has been paid to the impact of economic context on women’s depression, including socioeconomic status, income inequality, and neighborhood poverty (Belle, 1982; Dohrenwend et al., 1992; Kahn, Wise, Kennedy, & Kawachi, 2000; Lorant et al., 2003). For example, Belle demonstrated that poverty increases stress and leads to depression in women, especially for mothers with young children (Belle, 1982). Furthermore, a burgeoning literature has revealed the importance of contextual economic conditions in determining depression. For example, a 1999 study based in the United Kingdom, demonstrated the impact of material deprivation at the ward-level on depression (Wilson, Chen, Taylor, McCracken, & Copeland, 1999). In addition, a recent

study by Kahn and colleagues using data from the United States showed that state-level income inequality was associated with higher odds of depressive symptoms in women, net of individual income (Kahn et al., 2000). Further evidence of the importance of neighborhood economic context in determining depression stems from a recent housing voucher experiment in the US (Moving to Opportunity), which documented decreased rates of depression in women and children who moved from high-poverty urban neighborhoods to low-poverty suburban neighborhoods (Katz, Kling, & Liebman, 2001).

However, while the research on the effect of disadvantaged economic conditions (at both the individual and contextual level) on women’s depression is quite rich, the role of the “gendered context” (i.e. structural gender inequality) in shaping the gender discrepancies in depression remains unexplored. Although women’s subordinate position in society is closely associated with their lack of access to economic resources, material disadvantage also cannot fully account for the pervasive system of gender-based oppression (Connell, 1987). Examples of other contributing factors include social controls over women’s sexuality, restrictions on women’s reproductive rights, violence against women, undervaluation of women’s work, gender divisions in paid and unpaid work, and sexual segregation in waged work, to name a few. These issues cannot be adequately covered by using gender-neutral economic indicators.

With the rise in federalism in the past decades, the state has increasingly become the unit of legislation and policy implementation in the US. The power to legislate, fund and enforce policies and programs has been devolved to the individual states (Daniels, 1997). States that stipulate policies that enforce gender equality in reproductive, economic, political or other social domains can create a more women- and family-friendly environment. Conversely, states that neglect, tolerate or sanction women’s unequal social status can perpetuate women’s disadvantaged positions and consequently harm their mental and physical health. The Institute for Women’s Policy Research (IWPR) assembled 4 composite indices in 1996 to assess the status of women in fifty US states in four separate domains—“political participation”, “employment & earnings”, “economic autonomy” and “reproductive rights” to inform, identify and measure the barriers to gender equality at the state level (Institute for Women’s Policy Research, 1996). The women’s status indicators developed by IWPR thus provide an opportunity to test the association between the “gendered context” of society and women’s depression through the “society and health lens”.

We employed a multilevel analytical framework to examine the contribution of women’s status at the state-level for women’s depressive symptoms, taking into

account other individual and contextual determinants of depression. Individual level factors, such as age, race/ethnicity, income, education and unemployment status, are important determinants of depression, and were considered in our analysis (Horwath & Weissman, 1995). We also examined state level income inequality as an independent contextual predictor of depressive symptoms (Kahn et al., 2000). We hypothesized that women who live in states with higher women's status and autonomy would report lower levels of depressive symptoms, and vice versa, after controlling for other individual and contextual determinants of depression. In addition, while women as a group have shared issues, they are by no means a homogenous group (Doyal, 1995). We therefore hypothesized that contextual women's status has differential effects on women from varying racial and socioeconomic backgrounds. We tested for cross-level interactions to examine whether women with lower household incomes or from racial minority groups are more vulnerable to depression as a result of residing in areas with lower women's status.

Methods

Sources of data and study population

The data set was derived from the 1991 longitudinal follow up of the 1988 National Maternal Infant Health Survey (NMIHS). The 1988 NMIHS was a nationally representative population-based study using a stratified, systematic random sampling strategy to sample a total of 9953 women (between the ages of 15 and 49), who delivered live babies in 1988. The 1988 NMIHS is a follow-back survey that followed mothers who were named on 1988 live birth vital records. Mothers of black and low birth weight infants were over-sampled. In 1991, 8285 women (89%) with children aged 26–48 months were successfully followed in the longitudinal follow up survey. A total of 7789 women provided complete information for the outcome measure—CES-D score (Center for Epidemiological Study Depression scale); their sociodemographic characteristics are presented in Table 3. In multilevel regression analysis, we focused on women of reproductive age (17–40 years old) and women of extreme ages were excluded from the analysis ($N = 7507$).

Outcome variables: Center for epidemiologic studies depression scale (CES-D)

The CES-D, modeled as a continuous variable, was used to assess depressive symptomatology. CES-D was designed by the National Institute of Mental Health Center for Epidemiologic Studies. It is a 20-item, self-report or interviewer-administered instrument used to

detect the current (during the previous week) level of depressive symptomatology in the general population (Radloff, 1977). Responses to items on the CES-D are specified using a 4-point Likert scale (“0”: rarely or none of the time, less than 1 day/week, “1”: some or a little of the time, 1–2 days/week, “2”: occasionally or a moderate amount of time, 3–4 days/week, “3”: most or all of the time, 5–7 days/week).

Scores for CES-D range from 0 to 60; higher scores indicate greater severity of depressive symptomatology. The internal consistency reliability of CES-D ranged from 0.83 to 0.87 (Radloff, 1977). The construct validity of CES-D scale has been demonstrated on a community prevalence study in which the prevalence rate of clinical depression derived by a CES-D cut point set at 16 was similar to other self-report depression scales (Weissman & Myers, 1978). In addition, factor analysis has revealed that the factor structure of the scale is consistent across racial groups (Roberts, 1980).

Predictor variable: women's status indices

In 1996, the Institute for Women's Policy Research (IWPR) assembled 4 composite indices, representing four domains of women's status at the US state level—“political participation”, “employment and earnings”, “economic autonomy” and “reproductive rights” (Institute for Women's Policy Research, 1996). Most of the economic indicators of women's status (e.g. median earnings, ratio of women's to men's earnings, educational attainment, and poverty level) were derived from the 1990 census (Institute for Women's Policy Research, 1996). However, other indicators, such as those related to women's political participation and reproductive rights were based on data collected from 1992 onwards; therefore, they actually post-dated our outcome assessment (which was from 1991). In order to reflect women's status prior to 1991, we re-created those women's status indicators that were collected after 1992. The same methodology employed by IWPR was used to construct these indicators, applied to data from earlier years (between 1987 and 1991). The methodology for creating each index is described below.

Political Participation

The political participation composite index speaks to several spheres of political life that are relevant to women's status: (1) voter registration, (2) voter turnout, (3) female elected officials at the state and federal level and (4) women's institutional resources (the presence of a commission established by legislatures or executive orders for women, as well as legislative caucuses organized by women legislators in either or both houses of the state legislature for women).

Voter Registration and Voter Turn Out: The data used to construct the indicator were obtained from the

1988–1990 Current Population Surveys, which included the average percent of all women aged 18 and older who reported registering/voting in national elections (US Bureau of the Census, 1991).

Women in Elected Office: This composite indicator includes four components reflecting women's office-holding at the state and national levels as of December 1990—(1) Proportion of state level female elected officials including state representatives (weight=1.0), state senators (weight=1.25) and state-wide elected executive officials (weight=1.5). (2) US Representatives (weight=1.5), (3) US Senators (weight=1.75), and (4) Governors (weight=1.75). The percentages were first converted to scores ranging from 0 to 1 by dividing the observed value for each state by the highest value for all states and then weighted. The resulting weighted scores for the four components were added to yield the total score on this composite for each state. The methodology was developed by Center for Policy Alternatives (1995). The data was derived from the historical fact sheet compiled by the Center for American Women and Politics (Center for American Women and Politics, 2002).

Women's Institutional Resources: This indicator measured the number of institutional resources for women available in each state. Examples of women's institutional resources included the presence of state commissions on the status of women or legislative caucuses for women (Center for Policy Alternatives, 1995; Institute for Women's Policy Research, 1996).

Each component of the index was standardized (by subtracting the mean value from the observed value and dividing by the standard deviation), to remove the effects of differences in units of measurement across states. The standardized components were weighted ("Voter registration", "voter turn out" and "women's institutional resources" were each given a weight of 1.0 and "women in elected office" received a weight of 3.0) and summed to create a composite score. A higher index score indicates a higher level of women's political participation.

Employment & earnings

The composite employment and earnings index consisted of four component indicators measuring women's median earnings, female vs. male earning ratios, women's labor force participation and the proportion of women in professional and managerial occupations based on data collected in 1990 (Bureau of Labor Statistics, 1990a, b; Institute for Women's Policy Research, 1996). Each of the components was standardized by dividing the observed value for each state by the comparable value for the entire United States. These values were then summed for each state to create a composite score. A higher score indicates a higher level of women's employment & earnings.

Economic autonomy

The economic autonomy composite index measured women's ability to be economically independent, make choices and attain equal opportunities as men, in addition to their employment and earnings. The index was composed of the percent of women with health insurance, women's educational attainment, women's business ownership and percent of women above the official poverty level (Institute for Women's Policy Research, 1996). Each of the components was standardized by dividing the observed state value by the comparable value for the United States as a whole. Each component was weighted equally, and summed, to create a composite score. A higher score indicates higher women's economic autonomy.

Reproductive rights

The reproductive rights composite index measured women's autonomy over reproductive decisions at the state level. The information for this indicator was based on a report prepared by National Abortion and Reproductive Rights Action League Foundation (National Abortion Rights Action League Foundation, 1989). The component indicators covered six dimensions of women's reproductive rights including—whether governors and legislatures supported a ban or restrictions on abortion (weight=1.0), whether the state provided public funding for abortion (weight=1.0), whether the state mandated coverage for contraception and infertility treatment (weight=1.0), whether minors were permitted access to abortion without parental notification (weight=0.5), whether a mandatory waiting period was required for women to have abortions (weight=0.5), and the percent of women living in counties with at least one abortion provider (weight=1.0). Each component was scored either 0 or 1 and was weighted. The weighted scores were summed to derive a composite score. A higher score indicates a higher level of women's reproductive rights.

Further information on the data sources for each indicator and the weighting are reported in detail by the Institute for Women's Policy Research (1996).

As the relationships between women's status and depressive symptoms were not linear and some states surveyed only a limited number of women; we categorized each index into three groups of "high" (top 15 states that are highest in women's status indices), "medium" (middle 20 states in terms of the score on women's status indices) and "low" (bottom 15 states with the lowest scores in women's status indices).

Individual and contextual level covariates

Individual predictors for depression including categorical variables for age (<20, 20–24, 25–29, >30), race/

ethnicity (black, white, other racial group), family income ($\$ < 16,000$, $\$ 16,000–40,000$, $\$ > 40,000$) and educational attainment (below high school, some high school, beyond high school), employment status (employed, not employed) and marital status (never married, married, divorced/separated/widowed) were included in our models.

The level of income distribution at the state level (measured by Gini coefficient), an independent predictor of depression (Kahn et al., 2000), was included in the models as a control variable. Gini coefficient was grouped into approximate tertiles: “low” (≤ 0.415), “medium” (0.416–0.430) or “high” (> 0.430) inequality.

Analysis

A two-level multilevel linear regression model, with individuals at level-1 and the fifty US states at level-2, was fitted to estimate the contribution of contextual level women’s status on individual level women’s depressive symptoms, taking into account other individual and contextual determinants of depression. A multilevel approach was employed because we hypothesized that individuals in the same state are more similar, since they are exposed to the same levels of gender inequality. Multilevel analysis takes the correlated nature of individuals within the states into account, therefore, the individual–compositional sources of variation and the state-contextual ones can be distinguished. Traditional statistical analysis assumes independent observation for each data point, and is thus unable to account for the correlated data structure. Using multilevel analysis, we can also ascertain whether the variation between states is similar or different for individuals of different income, education and racial groups. Furthermore, the interaction between individual sociodemographic characteristics and state level women’s status indices can be estimated.

The multilevel software MLwiN (development version 1.2.0001) was used to implement the analysis (Rasbash et al., 2002). We employed iterative generalized least squares (IGLS) function to perform the analysis which uses maximal likelihood for parameter estimation (Goldstein, 1995).

The survey over-sampled blacks and mothers of low and very low birth weight infants in order to increase the precision of the estimates related to these populations. We used sampling weights provided by the National Center for Health Statistics to ensure that estimates represented the US distribution of women who gave birth to live babies in 1988. The weighting variable took into account the probability of selection and potential non-response bias.

The modeling strategy was carried out in sequential steps. We first presented the basic demographic char-

acteristics (e.g. gender, race/ethnicity and socioeconomic status) of the participants. The distribution and correlation of women’s status indices were also reported. Next, a two level model with only a constant term in the fixed part was fit (i.e. a null model without any predictors at any level). This model served as a base for future comparison. We then evaluated how the variability changes after including predictors at the individual level as well as the state level.

Next, random intercept models were built to estimate the relationship between state level women’s status and depressive symptoms. Four women’s status indices—political participation, employment & earnings, economic autonomy and reproductive rights, were specified as categorical variables (low, medium and high status) and with each modeled in separate regressions. An initial model (a model with categorical women’s status index as sole predictors) was specified to assess the crude association between each women’s status index and depressive symptoms. The crude models provided baseline information on the association between the four women’s status indices and individual CES-D scores prior to adjusting for other individual and state level covariates. Next, each women’s status index was included along with individual and state level covariates to test the independent effect of each women’s status index on depressive symptoms. Finally, a cross-level interaction model was built to evaluate whether state level women’s status had differential effects on depressive symptoms among women of different racial background and household income.

Results

Distribution of the composite indices of women’s status

The political participation index ranged from a high of 8.02 (Nebraska) to a low of -8.63 (Kentucky). The employment and earnings index ranged from a high of 4.69 (Alaska) to a low of 3.22 (West Virginia). The economic autonomy index ranged from a high of 4.50 (Maryland) to a low of 3.45 (Mississippi). The reproductive rights index ranged from a high of 4.67 (Hawaii) to a low of 0.02 (Kentucky and North Dakota). Table 1 ranks the top 5 and bottom 5 states regarding women’s status indices. Overall, women residing in the western states as well as in most of the Northeastern States were more likely to rank higher on two or more indices (e.g. California, New York, Vermont, Maine and Massachusetts). States in the Southeast tended to score lower on at least two of the women’s status indices (e.g. West Virginia, Kentucky, Tennessee, Mississippi and Louisiana). The correlation among the four indices ranged from 0.27 to 0.89 (Table 2). Among the four women’s status

indices, the political participation index had the lowest correlation with other indices (ranging from 0.27 to 0.49). The correlations among the remaining three indices were higher, ranging from 0.62 to 0.89. Note that given the high correlation between women's status indices, in particular, economic autonomy and employment & earning indices, these indicators are not really independent measures of state-level women's status.

Demographic characteristics

Table 3 shows the demographic characteristics and CES-D scores among the study subjects. The average CES-D score was about 10 (Standard Deviation = 9.03). Using CES-D score equal or greater than 16 as the cut off point (Weissman & Myers, 1978), about 20% of women had depression which was compatible with the results from National Comorbidity Survey (Kessler et al., 1994). Women who were younger, non-white, not currently married, unemployed, less educated or had lower household income tended to have higher level of depressive symptoms. Women's age, educational attainment and household income revealed an inverse gradient in relation to severity of depressive symptoms. At the contextual level, women who resided in states where women's status was lower tended to report more symptoms of depression. Higher state level women's status was associated with a protective effect on women's mental health.

Women's status indices and depressive symptoms

Table 4 shows the null model and models illustrating the crude associations between women's status indices and CES-D score. The null model showed statistically significant variations in severity of depressive symptoms at both the individual and the state level. Compared with the variability at the individual level, the between-states variation was much smaller ($\rho = 0.01$). The intraclass correlation (ICC) after adjusting for individual variables was 0.30% and slightly decreased when Gini coefficient was included (0.28%). As women's status indices (modeled as a 3-category variable) were included separately into the null model, the between state variations in the level of depressive symptoms decreased substantially (Table 4). The reduction in unexplained variance was most marked for the employment & earnings and the economic autonomy indices, where the between-states variations became non-significant after including these indicators. Except for the index of political participation, the crude associations showed that higher women's status at the contextual level was significantly associated with lower depressive symptoms at the individual level. A strong gradient effect was found for the employment & earnings and economic autonomy indices.

Table 5 shows the effect of women's status on symptoms of depression, adjusting for individual characteristics (age, race, marital status, educational level, employment status and household income) as well as

Table 1
Rank the top 5 and the bottom 5 States by Women's Status Indices

	Political participation		Employment & earnings		Economic autonomy		Reproductive rights	
	High	Low	High	Low	High	Low	High	Low
1	Nebraska	Kentucky	Alaska	W. Virginia	Maryland	Mississippi	Hawaii	Kentucky N. Dakota
2	Maine	Mississippi	Connecticut	Alabama	Colorado Connecticut	Arkansas	New York	
3	Vermont	Tennessee	Maryland	Louisiana		W. Virginia	Oregon	Nebraska
4	Kansas	Georgia	Massachusetts	Mississippi	Vermont	Louisiana	Connecticut	Mississippi
5	Minnesota	Utah	California	Arkansas	Massachusetts	Kentucky	Iowa	Kansas

Table 2
Correlations among composite indicators of women's status indices

	Political participation	Employment & earnings	Economic autonomy	Reproductive rights
Political participation	1.000	0.33*	0.49**	0.27
Employment & earnings		1.000	0.89***	0.64***
Economic autonomy			1.000	0.62***
Reproductive rights				1.000

* $p < 0.05$, ** $p < 0.001$, *** $p < 0.0001$.

Table 3
Demographic characteristics ($N = 7789$)

Variables	Mean (SD)	Range	N (%)	CES-D Mean (SD)
<i>Age</i>	25.78 (5.77)	15–46		
<20			1226 (15.74)	12.82 (9.94)
20–24			2205 (28.31)	11.42 (9.34)
25–29			2273 (29.18)	9.40 (8.56)
>30			2085 (26.77)	8.41 (8.01)
<i>Race</i>				
White			3848 (49.40)	8.77 (8.19)
Black			3690 (47.37)	11.82 (9.62)
Other			251 (3.22)	9.86 (8.14)
<i>Marital status</i>				
Married			4537 (58.25)	8.62 (7.88)
Never married			2252 (28.91)	12.58 (9.73)
Divorced/widowed/separated			984 (12.63)	12.46 (9.57)
<i>Family Income</i>				
Low (<15,999)			3379 (43.38)	12.66 (9.98)
Middle (16,000–39,999)			2547 (32.70)	9.18 (8.15)
High (\geq 40,000)			1863 (23.92)	7.34 (6.95)
<i>Employment status</i>				
Employed			3803 (48.83)	9.28 (8.24)
Not employed			3940 (50.58)	11.18 (9.63)
<i>Education</i>				
<9 years			227 (2.91)	12.99 (10.30)
9–12 years			4357 (55.94)	11.68 (9.60)
>12 years			3205 (41.15)	8.11 (7.56)
<i>CESD Score</i>	10.26 (9.03)	0~55		
<16			6201 (79.61)	
\geq 16			1588 (20.39)	
<i>Women's Status Indices</i>				
Political participation				
High			916 (11.76)	9.86 (8.72)
Middle			3636 (46.68)	10.24 (8.89)
Low			3237 (41.56)	10.37 (9.25)
Employment & earnings				
High			2844 (36.51)	9.52 (7.84)
Middle			3364 (43.19)	10.52 (9.04)
Low			1581 (20.30)	10.97 (9.32)
Economic autonomy				
High			2438 (31.30)	9.47 (8.79)
Middle			2763 (35.47)	10.18 (8.73)
Low			2588 (33.23)	11.05 (9.46)
Reproductive rights				
High			1973 (25.33)	9.58 (8.67)
Middle			3467 (44.51)	10.46 (9.06)
Low			2349 (30.16)	10.49 (9.06)

Table 4
Models showing unadjusted association between women's status indices and depressive symptoms

Variables	Crude association between women's status indices and CES-D									
	Null Model		Political participation and CES-D		Employment & earnings and CES-D		Economic autonomy and CES-D		Reproductive rights and CES-D	
	β estimates	s.e.	β estimates	s.e.	β estimates	s.e.	β estimates	s.e.	β estimates	s.e.
<i>Fixed part</i>										
<i>Individual level</i>										
Constant	9.33	0.17	9.64	0.27	10.16	0.25	10.06	0.22	9.59	0.27
<i>Contextual level</i>										
Political participation										
Medium			-0.47	0.37						
High			-0.58	0.47						
Employment & earnings										
Medium					-0.81*	0.32				
High					-1.42***	0.33				
Economic autonomy										
Medium							-0.87*	0.31		
High							-1.34***	0.33		
Reproductive rights										
Medium									-0.002	0.363
High									-0.91*	0.40
<i>Random part</i>										
State level (level-2)	0.62*	0.20	0.59*	0.24	0.18	0.12	0.21*	0.14	0.44*	0.20
Individual level (level-1)	72.13***	2.21	72.12***	1.16	72.22**	1.16	72.18***	1.16	72.14***	1.16
-2 loglikelihood	56416.2		56415.0		56432.6		56421.5		56416.5	

* $p < 0.05$, ** $p < 0.001$.

state level income inequality. The reference group was states scoring in the bottom 15 states on each women's status index. In general, states that were high in women's status were protective for women's mental health. Adjusting for individual and contextual covariates attenuated the association between women's status and CES-D score, although the beneficial effect of higher women's status on depression remained statistically significant for three out of the four indices. Political participation was the only women's status index that was not associated with women's depressive symptomatology. A gradient effect of women's status and CES-D score was found in the employment & earnings and economic autonomy indices.

After individual and contextual variables were included, the between individual variability (i.e. level-1 variation) in the symptoms of depression remained highly significant. In contrast, the contextual variation (i.e. level-2 variation) in depressive symptoms decreased markedly after adjusting for individual and contextual covariates (from 0.65 to 0.18).

We also performed the "test for trend" for each of the women's status indices; the p -values for political

participation, employment & earning, economic autonomy and reproductive rights index were 0.68, 0.01, 0.006 and 0.10, respectively.

Cross-level interaction

The interaction between contextual level women's status and individual characteristics such as household income and racial groups were estimated. No significant cross level interaction was found among any of the four women's status indices (data not shown). In other words, the effect of state level women's status on depression was homogenous among women from different racial and socioeconomic backgrounds.

Discussion

With the exception of political participation, the indicators of women's status in society—employment & earnings, economic autonomy and reproductive rights—were significantly linked to women's depressive symptoms. Women in states where they had more

Table 5
Contextual level women's status and depressive symptoms, adjusting for individual characteristics as well as state income inequality

Variables	Political participation and CESD		Employment & earnings and CESD		Economic autonomy and CESD		Reproductive rights and CESD	
	β estimate	s.e.	β estimate	s.e.	β estimate	s.e.	β estimate	s.e.
<i>Fixed part</i>								
<i>Individual level</i>								
Constant	15.01	1.20	15.40	1.25	15.45	1.22	15.00	1.25
Age (base: <20 years old)								
20–24	0.15	0.50	0.15	0.50	0.15	0.50	0.14	0.50
25–29	-0.61	0.51	-0.60	0.52	-0.60	0.52	-0.62	0.52
> 30	-1.66***	0.47	-1.63***	0.47	-1.63***	0.48	-1.66***	0.48
Race (base: White)								
Black	1.35***	0.29	1.28***	0.29	1.30***	0.28	1.37***	0.28
Other race	1.33*	0.53	1.45*	0.55	1.47*	0.55	1.35*	0.53
Marital status (base: single)								
Married	-1.09**	0.38	-1.13**	0.38	-1.12**	0.38	-1.09**	0.38
Others	1.55*	0.59	1.50*	0.59	1.50*	0.60	1.53*	0.60
Education (base: <9 years)								
9–12 years	-3.06**	1.23	-3.12**	1.22	-3.12**	1.22	-3.02**	1.23
13 years or more	-4.76***	1.26	-4.81***	1.24	-4.81***	1.24	-4.72***	1.26
Employment (base: unemployed)								
Employed	-0.18	0.30	-0.19	0.30	-0.20	0.31	-0.18	0.30
Income (base: \$ < 16,000)								
\$16,000–40,000	-1.71***	0.26	-1.71***	0.26	-1.71***	0.26	-1.72***	0.26
> \$40,000	-2.04***	0.31	-2.02***	0.31	-2.02***	0.31	-2.05***	0.31
<i>Contextual level</i>								
Income inequality (base: low Gini)								
Medium Gini	0.70	0.37	0.74*	0.31	0.69*	0.31	0.81*	0.34
High Gini	0.43	0.35	0.38	0.28	0.21	0.30	0.23	0.31
Women's status indices								
Political participation (base: low)								
Medium	-0.07	0.39						
High	-0.19	0.27						
Employment & earnings (base: low)								
Medium			-0.35	0.26				
High			-0.85**	0.27				
Economic autonomy (base: low)								
Medium					-0.39	0.25		
High					-0.83**	0.25		
Reproductive rights (base: low)								
Medium							0.20	0.25
High							-0.62*	0.29
<i>Random part</i>								
State level (level-2)	0.18	0.12	0.00	0.00	0.00	0.00	0.06	0.08
Individual level 1 (level-1)	64.81***	1.06	64.89***	1.06	64.88***	1.06	64.83***	1.06

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

resources, opportunities and autonomy reported lower levels of depressive symptoms; conversely, states that tolerate gender inequality were associated with higher depressive symptoms. Our analysis also demonstrated that income inequality was significantly related to depressive symptoms. The results also suggested that income inequality does not completely account for women's disadvantaged social positions relative to men.

The mechanisms by which societal women's status influences women's mental health can operate through multiple pathways. For instance, states in which women's status is relatively high may be more likely to institute policies that are beneficial to women's mental health by providing material and social resources for women. For example, higher wages, health insurance, state funding for reproductive choices and family friendly policies can improve women's life opportunities and enable them to attain a decent standard of living for themselves and their families. Women's status may also operate through psychosocial pathways by reducing stress related to overt and covert gender discrimination, which may act over and above individual characteristics to influence women's mental health. The broader socio-contextual approach can thus provide valuable information for policy action. Our results suggest that women's depressive symptoms can be reduced by increasing their access to economic resources, creating employment and promotional opportunities or strengthening their autonomy over their reproductive decisions. Rather than treating women as a "high risk" group, the population approach suggested by our analysis may prove more powerful in changing the population distribution of depressive symptoms in women (Rose, 1985).

To our knowledge, the present study is the first to demonstrate the joint contribution of contextual-level women's status and individual-level women's socioeconomic conditions on women's depressive symptoms. One of its strengths is its multilevel design, which allows us to discern the contextual effect of women's status on symptoms of depression, after taking into account individual compositional characteristics. Studies that use ecological data are not able to make inferences to the individual level. The present study, however, has the strength of estimating the impact of the contextual level women's status without committing the ecological fallacy. In addition, multilevel analysis enables us to determine the joint influence of societal level women's status and women's individual socioeconomic positions on symptoms of depression.

The political participation index was the only women's status indicator that was not significantly associated with symptoms of depression. There are several possibilities to account for this finding. First of all, it is possible that women who lived in states where inequality was rife were much more motivated to participate in politics in order to alter their disadvan-

tagged conditions. For example, North Dakota had the highest voter registration rates, but it ranked last in the reproductive rights index (Table 1). As a result, the null finding may be caused by endogeneity (i.e. the explanatory variable is affected by other factors). Secondly, even though the number of women in public office has been increasing, women are still the minority in the political system. In an environment dominated by men, women politicians may be forced to survive by following the priorities that the majority group adopts (Thomas & Welch, 2001), and may not push their views (such as in improving women's welfare) out of fear of being labeled as "too narrow", "not interested in broader national issues" or "only interested in women's issues" (Carroll, 1984; Thomas & Welch, 2001). Furthermore, there may be a threshold effect for women's political participation. Thomas and Welch report that the existence of a critical mass of women politicians working collectively is crucial for women's policy impact (Thomas & Welch, 2001), as they may have better chance of passing legislation benefiting women, children and families (Thomas & Welch, 2001). Therefore, it is possible that women's political participation may not have contributed to the amelioration of women's depressive symptoms because women are still an oppressed group in the current political system. Finally, since the effect of the social context on individual health is often not instantaneous (Macintyre, Ellaway, & Cummins, 2002), the time lag before women's political participation begins to take effect on symptoms of depression may be different from other women's status indices.

Feminist theory and practice has been criticized as being white, western and middle-class centered (Doyal, 1995), and special needs of women suffering from cumulative disadvantages in relation to their race, socioeconomic conditions, sexuality or physical disabilities have been neglected. Rejecting the crude universalism that treat women as one homogenous group (Doyal, 1995), the present study assessed the interaction between structural women's status and individual women's characteristics in order to assess whether structural gender inequality has a differential influence on women from different socio-demographic backgrounds. Our results did not indicate the presence of cross-level interaction. In other words, societal women's status had a similar impact on individual level women's depressive symptoms regardless of their socioeconomic and racial backgrounds. Even though women of lower socioeconomic status or from racial minority groups had higher levels of depressive symptoms, the extent to which they could enjoy the benefits under conditions of higher societal women's status was identical across groups.

A number of limitations should be considered in the interpretation of these results.

Firstly, the cross-sectional nature of the study limits our ability to draw causal inferences. For example, it is possible that mentally healthy individuals might have better chances of being able to move to states with higher women's status while depressed individuals remained in unhealthy states. Another limitation inherent in cross-sectional study is the loss of temporality between exposure and outcome. The information on our exposure variable, women's status indices, was collected across a 5-year time span (1987–1991). Given the varying timing of the data assembled in our analysis, we assumed that the contextual exposure was stable over time and that a one- to five-year induction period was plausible for women's status to take effect. But the stability assumption may not hold for some of the indices, since indicators may change over a relatively short time span (e.g., political participation). Also, the latency needed for contextual level women's status to have an effect on mental health has not been fully elucidated. Further longitudinal studies examining the relationships between contextual women's status and individuals' mental health over time are needed.

Second, gender inequality does not exist solely at the state level, but occurs across a variety of contexts including the domestic realm (e.g., household division of labor, economic resources, women's control over sexual relationships), the neighborhood (e.g., community crime rates, availability of local resources for women, policing on domestic violence) and institutions (e.g., equal opportunities to employment and promotion, equal pay for comparable work, paternal leave policy), to name a few. Gender inequality at different levels of social lives may independently or interactively affect women's mental health (Hall, 2000). Although we attempted to adjust for women's educational attainment, household income, and employment status as a proxy for women's ability to control and mobilize their resources at multiple societal levels, we lacked data on women's status at several relevant levels. Given the low intra-class correlation ($r = 0.01$) at the state level, the observed state level effect may derive from a lower level of aggregation. Our findings would have been strengthened if women's status data were available on household, neighborhood, and institution or other pertinent societal levels. Should we have women's status data on multiple societal levels, not only would we be able to analyze the effect of women's status across multiple hierarchical contexts (e.g., household, neighborhood, states) but also be able to assess the impact of overlapping "cross-classified" contexts (e.g., neighborhoods and workplaces are over-lapped contexts) (Subramanian, Jones, & Duncan, 2003).

A final caveat regarding the interpretation of our results is the possibility that the observed relationship between contextual level women's status and depression may be due to the omission of or inadequate control for either

individual or contextual level variables. For instance, some unidentified variables might still be of concern in the interpretation of our results (e.g., patriarchal culture). Furthermore, the evidence for contextual effects rest largely on the findings of the employment & earnings and the economic autonomy indices, thus raising the question of whether the significant correlation between the state-level economic variables could be eliminated by having better control over individual level income. However, we did our analysis by grouping household income into five categories (<\$10,000, \$10,000–19,999, \$20,000–34,999, 35,000–49,999, \geq \$50,000). The significance of state level economic variables remained regardless of the way household income was categorized, indicating that the contextual effects were independent of individual-level income.

Despite the search for individual level determinants of the female excess in depression, empirical evidence has failed to disclose the existence of innate differences in biology (e.g. sex hormones, x-chromosome, neurotransmitter) or psychology (e.g. neuroticism, coping style) that could fully explain the gender disparities (Piccinelli & Wilkinson, 2000). Studies that adopt a biomedical lens or a psychosocial lens remain silent on the realities of sexism that generate women's mental illness and suffering in society (Doyal, 1995; Homshaw & Hillier, 2000). In seeking to situate women's depression within the social context, the present study investigated four composite indices of women's status—political participation, employment & earnings, economic autonomy and reproductive rights—in determining women's depressive symptoms. The current findings reveal that contextual gender inequality is a significant determinant of women's depressive symptoms. Our results have demonstrated the need to widen the scope of research into gender inequality in mental health from individual-centered explanations to the societal domain. Formulation of effective strategies to eliminate barriers to gender equality must be a central concern not only in feminist politics, but also as a strategy of health promotion.

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