



The depression and marital status relationship is modified by both age and gender



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ABSTRACT

Background: Marital status is associated with major depression prevalence, however, the strength of association may be modified by age and gender.

Methods: The data sources were a series of cross sectional national health surveys of the Canadian population carried out by Statistics Canada during 1996–2013. These were cross-sectional files from the National Population Health Survey of 1996, together with the Canadian Community Health Surveys from 2000 to 2013; the respondents were 18 years and older. The data was analyzed with meta-analytic techniques and logistic regression.

Results: In terms of gender, the odds ratios of depression were smaller for females (vs males) who were single, widowed or separated compared to married people. Regarding age, the odds ratios for depression showed a steady rise with increasing age for those in single and in common-law relationships compared to married people. In contrast the odds ratios for depression declined with age for those widowed, separated and divorced compared to married people. The strength of the interaction terms used to quantify these moderating effects showed no change from 1996 to 2013.

Limitations: Only one member of each household was included, so that relationship issues could not be studied. The generalizability of our findings requires international data. Also the diagnostic interviews used are not as accurate as clinical assessments.

Conclusion: Use of large numbers of participants has revealed some robust modifying effects of both gender and age on the depression/marital status relationship. The clinical significance of our findings is that the vulnerability to development of depression is not only related to marital status, but that this relationship is modified by age and gender.

1. Introduction

According to the Global Burden of Disease Study 2015 major depression is a leading cause of years lived with disability globally, coming third after lower back and neck pain, and sense organ diseases, respectively (GBD, 2015 Collaborators). Major depression can be the cause or the result of social, psychological and biological factors such as age and sex. Studies have repeatedly shown that the prevalence of depression is higher in women than men worldwide (Kessler et al., 2015). In terms of age, the prevalence of depression decreases steadily with advancing age, and although depression is more prevalent in young women compared to men, this prevalence difference decreases with age and is no longer evident in people over 75 years old (Patten et al., 2016).

One key social factor that modifies depression is marital status, and

research has repeatedly shown that married people have better mental health than those who are single, widowed, separated and divorced (Bebbington 1987; Jang et al., 2009; Bulloch et al., 2009; LaPierre, 2009). It has also been shown that the relationship between marital disruption and depression is bidirectional (Bulloch et al., 2009). That being married is protective for depression is not an exclusively Western phenomenon as depression is also relatively high in unmarried Japanese (Inaba et al., 2005). A meta-analysis of people > (or =) 55 years old showed that being unmarried is a significant risk factor for depression in late life (Yan et al., 2011). However in Koreans aged 75–85 years no relationship between marital status and depression was found for women, whereas divorced and widowed men had higher rates of depressive symptoms than their married counterparts (Jang et al., 2009). Taken together these studies show that there is a complex relationship between age, sex, marital status and depression. In this study

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Table 1
Sample sizes in each survey – Age 18 plus.

Surveys	Total N = 878,965	Depressed	Not depressed
NPHS 1996	67,705	2921	62,211
CCHS 1.1	115,977	8842	104,131
CCHS 1.2 mental health	35,216	1852	33,176
CCHS 2.1	118,876	2682	40,188
CCHS 3.1	118,206	3562	58,515
CCHS 07/08	117,894	2616	38,513
CCHS 09/10	111,077	2954	48,616
CCHS 11/12	112,377	1230	18,024
CCHS 12 mental health	23,846	1236	22,455
CCHS 2013	57,791	1106	17,301

we examined how age and sex modify the association of marital status with major depression as an outcome. Interaction terms in regression models were used to quantify the modification observed, such that the term interaction is used in the remainder of this paper to refer to the resulting subgroup variations. Use of a very large data set enabled us to examine married and common-law categories separately, whereas these are usually combined in existing studies. Similarly we were able to study widowed, separated and divorced categories which are also often combined.

2. Methods

This study used the cross-sectional data files collected in an early cycle of the National Population Health Survey (1996), the general health surveys of the Canadian Community Health Survey (2000, 2003, 2005, 2007/2008, 2009/2010, 2011/2012 and 2013), plus the two mental health Canadian Community Health Survey of 2002 and 2012 (Table 1). These surveys used a complex multistage sampling procedure to obtain a representative sample of the Canadian population. First geographical clusters were selected, then households were selected within the clusters and finally one respondent per household was selected. The data analyzed here is for those 18+ years old.

In the NPHS survey and in most of the CCHS surveys past year Major Depressive Episode (MDE) was assessed with an abbreviated fully structured diagnostic interview, the Composite International Diagnostic Interview Short form for Major Depression (CIDI-SFMD) (Kessler et al., 1998). The CIDI-SFMD was developed from the National Comorbidity Survey with receiver operator analysis designed to detect a subset of CIDI items most highly predictive of MDE. In addition, the requirement for a total of 5 symptoms, including one of the two cardinal symptoms in the DSM definition provide face validity for the instrument. The two mental health CCHS surveys used a more comprehensive interview that is a Canadian adaptation of the World Health Organization Mental Health (WMH)-CIDI (Kessler and Ustun, 2004). The WMH-CIDI is the most widely used fully structured diagnostic instrument in psychiatric epidemiology and produces similar estimates to the CIDI-SFMD (Patten et al., 2015).

We analyzed the data with individual-level meta-analysis using both 1-step and 2-step approaches, using the former approach in the primary analysis and the latter as a means of confirming the robustness of the results. In the 1-step approach a pooled data set was created from all the surveys for direct derivation of estimates. This is called a one-step approach since after pooling the data can be analyzed using non-meta-analytic procedures. In this approach, replicate bootstrap weights were rescaled for use in the pooled data set (Statistics Canada provides sets of 500 such weights for each survey to account for the complex design effects of these surveys). The combined sample size of the surveys was n = 878,965. The replicate bootstrap weights were rescaled by dividing the number of participants in each individual survey by 878,965 and multiplying the weights by this proportion. Weighted logistic regression with bootstrapped derived variance estimation was then performed.

Table 2
Depression and age-sex interactions.

Depression	ONE STEP – LOGISTIC REGRESSION		2 STEP REGRESSION	
	OR	P-value	OR	P-value
	95% CI		95% CI	
Age (continuous)	0.98	< 0.001	0.98	< 0.001
	0.98–0.99		0.98–0.99	
Sex (female)	2.18	< 0.001	2.20	< 0.001
	1.99–2.39		2.01–2.41	
Age*Sex interaction	0.99	< 0.001	0.99	< 0.001
	0.99–1.00		0.99–1.00	
Marital Status^a				
Common-law/ partner	0.91	0.099	0.93	0.258
	0.81–1.02		0.82–1.06	
Single	1.42	< 0.001	1.43	< 0.001
	1.29–1.58		1.30–1.59	
Widowed	19.35	< 0.001	15.84	< 0.001
	12.61–29.69		11.50–21.83	
Separated	6.56	< 0.001	6.44	< 0.001
	5.20–8.28		4.80–8.66	
Divorced	3.58	< 0.001	3.75	< 0.001
	3.01–4.25		3.17–4.44	
Interactions (sex)				
(female)				
Single*sex	0.87	0.002	0.87	0.006
	0.80–0.95		0.78–0.96	
Widow*sex	0.64	< 0.001	0.68	< 0.001
	0.53–0.79		0.55–0.84	
Separated*sex	0.70	< 0.001	0.74	< 0.001
	0.58–0.84		0.63–0.87	
Interactions (age)				
Common-law*age	1.01	< 0.001	1.01	< 0.001
	1.01–1.02		1.01–1.02	
Single*age	1.02	< 0.001	1.02	< 0.001
	1.01–1.02		1.01–1.02	
Widow*age	0.96	< 0.001	0.96	< 0.001
	0.95–0.97		0.96–0.97	
Separated*age	0.99	< 0.001	0.99	0.003
	0.98–0.99		0.98–1.00	
Divorced*age	0.99	< 0.001	0.99	< 0.001
	0.99–1.00		0.99–1.00	

Notes. The table gives the impression that the 2-step estimates are from a single model. Rather these are pooled estimates of model parameters from analyses of the individual surveys. Where the ORs = 1.0, they are < 1.0 to 3 decimal places.

^a Married is the baseline group, the other marital status categories are dummy coded using 0 or 1 values.

The results are expressed as Odds Ratios (ORs) with 95% Confidence Intervals (CIs).

For the two-step approach beta coefficients in logistic regression models were estimated from each survey (step 1) and then pooled (step 2) using meta-analytic methods. Possible interactions were examined by inclusion of cross-product terms of both marital status and sex, and also marital status and age. All models included age as age since 18 years (the minimum age of eligibility in these surveys), in order to create an interpretable intercept term in the models. Random effects meta-regression was used to test for changes over time (i.e., time was a variable included in the models). These analyses used the “metan” command in Stata version 13 [23] and were conducted in the Prairie Regional Data Centre of Statistics Canada at the University of Calgary. This research was approved by the Ethics Review Board of the University of Calgary.

3. Results

First we performed a 1-step analysis on the pooled data from all 10 surveys. We were able to include all 5 categories of marital status (Table 2) and we calculated the odds ratios of depression in each category, and estimated the influence of sex and age. A significant

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