

ASSOCIATION AMONG ITEMS FROM THE SELF-REPORT
VERSION OF THE HAMILTON DEPRESSION SCALE (CARROLL
RATING SCALE) AND RESPONDENTS' SEX¹

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Summary.—The association among items of the self-reported version of the Hamilton Depression Scale (Carroll Rating Scale), answered according to a memory of a maximally disturbing event experienced, and respondents' sex was examined in a non-clinical sample of 320 college students, 164 women (M age = 21.7 yr., SD = 3.6) and 156 men (M age = 23.5 yr., SD = 5.8). An assessment of sex bias was also evaluated. Multiple regression analysis showed that statements regarding unhappiness, urge to cry, dizziness and faintness, and waking in the middle of the night were significantly associated with women. Removal of these items from the Carroll Rating Scale Total scores eliminated the sex differences in depression rates. Items that displayed significant sex bias were those regarding behavior and emotions commonly attributed to women within the general population.

Epidemiological and clinical studies on depression and depressive symptoms consistently point to a higher prevalence in both adult and teenage women (Weissman & Klerman, 1977; Kessler, McGonagle, Zhao, Nelson, Hughes, Eshleman, Wittcher, & Kendler, 1994; Olsson & von Knorring, 1997; Hankin & Abramson, 2001). Several studies have shown that women also scored higher on depressive and anxiety symptoms at a subclinical level (Hendrie, Clair, Brittain, & Fadul, 1990; Linn, Allen, & Willer, 1994). Depressive symptoms are more common in women also in Brazilian studies (Gorenstein, Pompeia, & Andrade, 1995; Feijo, Saueressig, Salazar, & Chaves, 1997).

There are “artificial” and “real” explanations for these sex differences. The “real” explanations can be hormonal factors (Halbreich & Kahn, 2001), genetic disposition (Kendler & Prescott, 1999; Kendler, Thornton, & Prescott, 2001), social and socialization factors (Wilhelm, Parker, & Dewhurst, 1998; Horsfall, 2001), different coping styles (Cyranowski, Frank, Young, & Shear, 2000; Hankin & Abramson, 2001), and sex differences in the rates of reported stressful life events or differential sensitivity to the pathogenic effects (Kendler, *et al.*, 2001; Maciejewski, Prigerson, & Mazure, 2001). Artifi-

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cial explanations may be produced by gender-related bias as differences in help-seeking behavior (Weissman & Klerman, 1977), symptom reporting patterns (Moller-Leimkuhler, 2002), recalling of depressive episodes (Ernst & Angst, 1992; Wilhelm & Parker, 1994), and self-ratings and measures of depression (Newmann, 1987; Nolen-Hoeksema, 1987; Wilhelm & Parker, 1994). Men remember their previous depressive episodes less than women, in clinical samples of patients with depression (Ernst & Angst, 1992; Wilhelm & Parker, 1994). However, there is evidence against these findings (Kuehner, 2003). On the other hand, there is no difference between men and women regarding the depressogenic effects of stressful life events (Kendler, *et al.*, 2001).

Another hypothesis is that behavioral and “cognitive pattern” disparities between men and women in response to stressful events (Gilligan, 1982; Newmann, 1987; Nolen-Hoeksema, 1987; Williams & Morris, 1996) may be biased, thus allowing for an assessment bias in the detection of depression and depressive symptoms.

The observation of sex differences in depression is in early adolescence and construction of gender stereotypes can play a central role. The construction of gender identity that incorporates gender stereotypes begins before adolescence but may exert its greatest effect at that time, when myriad changes and social stresses converge on girls. Even the sex difference in ruminative versus distractive coping styles, as a possible precursor of sex difference in depression, may emerge from the stereotypes that males are active and ignore their moods, while females are emotional and inactive (Nolen-Hoeksema, 1987). Rating scales and diagnostic instruments may be conveyed in a more ‘feminine’ verbal communication commonly used by women to express feelings and attitudes in response to stressful events, thus being a possible cause for the above mentioned bias. This artifact may generate significant depressive symptom and diagnosis differences in men and women. A study concluded that some instruments meant to screen depression might include gender-biased items and give higher scores of depressive symptoms in women (Salokangas, Vaahtera, Pacriev, Sohlman, & Lehtinen, 2002). However, an epidemiological study showed that there were no significant sex differences in self-report of depression symptoms (Bogner & Gallo, 2004).

Determinants of sex differences in depression rates are far from being established (Piccinelli & Wilkinson, 2000). Considering the overlap between the stereotypical views of women and the definition, criteria and rating scales used for depression, and the role of the stressful life events, the hypothesis was that men and women scored differently on depression rating scale items because some tests meant to screen depression or symptoms of depression might have gender-biased items. This exploratory study aims to evaluate the performance of a nonclinical sample on a self-reported version of the Hamil-

ton Depression Scale (Carroll Rating Scale), after recalling a stressful (potentially 'depressogenic') event and to analyze the association of the scale's items with sex. The investigation also explored whether the exclusion of the identified gender-related items from the global score of the Carroll Rating Scale modified the association of sex with symptoms of depression.

METHOD

A cross-cultural study sorted by sex was implemented. The outcome was the cognitive and behavioral response, that is, the objective negative impact triggered by recalling the most painful or sad (maximally disturbing) situation the subject has ever experienced. All the data were obtained by self-report. The study was approved by the Hospital de Clinicas de Port Alegre and University Research Committee. All participants signed an informed consent form.

Three hundred and thirty-one subjects were invited. Only 11 (eight men and four women) refused to participate, and 320 were interviewed. Participants were invited to the university campus according to a pre-established order defined by sex distribution. Interviewers were not aware of this rule, but protocols were already sorted by sex. The sample was composed of 156 men and 164 women, with ages ranging from 18 to 30 years ($M=26$, $SD=18$). This sample size was sufficient to detect a sex difference in at least 10% of the items of the Carroll Rating Scale with a statistical power of 80% and an alpha of 5%.

This sample of convenience included healthy young adults (college students) carrying out normal activities without academic problems. Criteria excluded subjects with cognitive deficits or severe clinical or major psychiatric conditions.

A mental disorder screening tests, the Self-reporting Questionnaire (Mari & Williams, 1986), was used to control for the presence of minor psychiatric disorders. The Self-reporting Questionnaire-20 was developed by the World Health Organization as a screening tool for minor nonpsychotic psychiatric disorders (Harding, Climent, Diop, Giel, Ibrahim, Murthy, Suleiman, & Wig, 1983). It has proved to be a useful and valid instrument for identification of probable cases in the general population (Mari & Williams, 1986; Iacononi & Mari, 1989), however it does not provide a clinical diagnosis. Participants, 13 men and 34 women, scored above the Self-report Questionnaire cutoff.

Subjects answered a demographic data questionnaire, and social class was determined by the Brazilian Economic Classification Criteria from the Brazilian Association of Market Research.²

²Associação Brasileira de Empresas de Pesquisas. (2003) Critério de classificação econômica Brasil. Downloaded March 23, 2007, at http://www.abcp.org/codigosguias/ABEP_CCEB.pdf.

To recall the maximally disturbing emotional experience (most difficult, painful, or saddest), a Portuguese version of Knapp and colleagues' emotion induction was applied (Knapp, Levy, Giorgi, Black, Fox, & Heeren, 1992). Subsequently, participants answered the Carroll Rating Scale. This is a self-report version of the Hamilton Depression Scale that has 52 Yes-No self-rating items, with a cutoff score of 10 for depression (Carroll, Feinberg, Smouse, Rawson, & Greden, 1981). The subjects were told to answer in relation to their reaction in recalling the event.

The Student *t* test was used to compare age and Carroll Rating Scale Global score between sexes, whereas a chi-square test checked association of marital status and social class. The distribution for individual items by respondents' sex was also assessed using the chi-square test. A logistic regression model was used to identify items' association with respondents' sex as well as the magnitude of the associations. Subjects were classified as positive or negative using the cutoff of 10 for depression (Carroll, *et al.*, 1981). The association of age, sex, social class, and Self-report Questionnaire with Carroll Rating Scale Global score was measured by logistic regression. In addition, the same regression was performed after the removal of the items associated with sex from the Carroll Rating Scale Global score, applying the same cutoff (10). The analyses were carried out with the SPSS statistical package (Version 11.02 for Windows).

RESULTS

Demographic data and Carroll Rating Scale scores are shown in Table 1. No differences were found in social class and marital status between groups of men and women. Although the men were significantly older than

TABLE 1
DEMOGRAPHIC DATA AND GLOBAL SCORE OF SELF-REPORT VERSION OF
HAMILTON DEPRESSION SCALE (CARROLL RATING SCALE)

Variable	Men (<i>n</i> = 156)		Women (<i>n</i> = 164)		<i>t</i> or χ^2
	<i>f</i>	%	<i>f</i>	%	
Age, yr. ^a	23.5	5.8	21.7	3.6	3.2*
Social Class ^b					
A	96	61.5	87	53.0	2.4
B	50	32.1	65	39.5	
C	10	6.4	12	7.3	
Marital Status ^b	<i>n</i>	%	<i>n</i>	%	
Single	132	84.6	146	89.0	2.7
Married	15	9.6	8	4.9	
With mate	7	4.5	8	4.9	
Divorced	2	1.3	2	1.2	
Carroll Rating Scale ^a	16.1	7.5	21.6	8.6	-5.9†

^aStudent *t* test. ^bChi square. **p* < .01. †*p* < .001.

TABLE 2
 ITEMS OF SELF-REPORT VERSION OF HAMILTON DEPRESSION SCALE (CARROLL RATING SCALE) AND
 SIGNIFICANT SEX ASSOCIATION (CHI-SQUARE WITH YATES CORRECTION OR FISHER EXACT)

Carroll Rating Scale Item	Men		Women		χ^2	Odds Ratio	95% CI
	Yes	No	Yes	No			
1. I felt as energetic as always.	36	120	21	143	5.08*	2.04	1.13-3.69
2. I lost weight.	40	116	69	95	8.89†	2.15	1.31-3.39
4. I completely lost interest in sex.	10	146	40	122	18.69‡	4.79	2.30-9.97
6. It must be obvious that I was disturbed and agitated.	113	43	136	28	4.51*	1.85	1.08-3.16
8. I could concentrate easily when reading the paper.	55	101	33	131	8.44†	2.16	1.30-3.58
10. I was restless and fidgety.	107	49	134	29	4.57*	2.12	1.25-3.58
13. I had a lot of trouble with dizzy and faint feelings.	5	151	26	138	13.21‡	5.70	2.13-15.23
15. My interest in sex did not change.	95	61	73	90	7.67†	1.92	1.23-3.00
16. I was miserable or often felt like crying.	71	85	145	19	65.14‡	9.14	5.16-16.20
18. I had trouble with indigestion.	29	127	53	111	7.20†	2.51	1.25-3.15
19. I woke up often in the middle of the night.	38	118	77	87	16.76‡	2.75	1.70-4.43
21. I was so slowed down that I needed help bathing and dressing.	1	155	10	154	5.62*	10.06	1.27-79.58
23. Most of the time I was very afraid but I did not know the reason.	25	131	48	94	7.23†	2.17	1.25-3.74
25. I got pleasure and satisfaction from what I did.	48	106	30	134	6.43*	2.02	1.20-3.41
27. My mind was as fast and alert as always.	61	95	36	128	10.34†	2.28	1.40-3.73
30. My voice was dull and lifeless.	49	107	88	76	15.27‡	2.53	1.60-3.99
36. I still enjoyed my meals as much as usual.	101	55	83	80	5.69*	1.77	1.13-2.77
38. I was terrified and near panic.	17	139	34	129	5.17*	2.15	1.15-4.04
39. My body was bad and rotten inside.	22	134	53	111	13.78‡	2.90	1.67-5.08
41. My hands shook so much that people could easily notice.	44	112	73	91	8.48†	2.04	1.28-3.25
42. I still liked to go out and meet people.	112	43	94	70	7.14†	1.94	1.21-3.10
43. I thought I appeared calm on the outside.	121	32	90	73	19.21‡	3.07	1.87-5.04
49. I worried a lot about my bodily symptoms.	19	135	43	120	4.51*	1.85	1.08-3.16
50. I had to force myself to eat even a little.	44	110	78	85	11.63‡	2.29	1.44-3.65
51. I was exhausted much of the time.	16	135	38	124	8.18†	2.59	1.37-4.87

* $p < .05$. † $p < .01$. ‡ $p < .001$.

the women, age was not significantly correlated with Carroll Rating Scale scores ($p=.36$). Women had significantly higher Carroll Rating Scale scores.

Twenty-five of 52 items of the Carroll Rating Scale showed significant association with respondent's sex in the univariate analysis (Table 2). The Carroll Rating Scale items were further evaluated by the logistic regression, allowing calculation of coefficients for each item as independent variables in the equation expressing 'weights' for the outcome (respondent's sex). The logistic regression analysis showed association *only* between questions 13, 16, and 19, and sex (Table 3). The chance was 77.7% higher for the scale to be answered by a woman if the statements regarding unhappiness, urge to cry, increased problems with dizziness and faintness, and awakening in the middle of the night were positive.

TABLE 3
LOGISTIC REGRESSION OF ITEMS OF CARROLL RATING SCALE WITH RESPONDENT'S SEX

Item of Carroll Rating Scale	Beta	SE	Wald	<i>p</i>	OR	95% CI
I was miserable or often felt like crying.	1.86	0.38	30.51	.01	6.44	3.32–12.46
I had a lot of trouble with dizzy and faint feelings.	1.69	0.62	7.47	.006	5.43	1.61–18.26
I woke up several times during the night.	0.73	0.30	5.82	.016	2.08	1.15–3.76

*Female was the reference category.

The application of the established cutoff for the Carroll Rating Scale to detect symptoms of depression of 10 classified 107 out of 148 men and 136 out of 154 women as positive. After the removal of the three sex-associated items from the Carroll Rating Scale Global scores, 107 out of 148 men and 131 out of 154 women were still positive. Among men who scored above the cutoff, the removal of the three items reduced the Carroll Rating Scale mean score from 19.6 ($SD=5.8$) to 18.6 ($SD=5.5$), which was not significantly different ($t=1.23$, $p=.21$). Among women who scored above the cutoff, the reduction from 23.4 ($SD=0.6$) to 22.2 ($SD=0.6$) was also not significantly different ($t=1.38$, $p=.17$).

In addition, a new logistic regression analysis, using the established Car-

TABLE 4
LOGISTIC REGRESSION ANALYSIS OF CARROLL RATING SCALE: AGE, SELF-REPORTING QUESTIONNAIRE, SEX, AND SOCIAL CLASS

Variable	Beta	SE	Wald	<i>p</i>	OR	95% CI
Age	0.01	0.03	0.001	.978	1.00	0.94–1.06
Sex*	0.90	0.34	7.006	.008	2.46	1.26–4.80
Self-reporting Questionnaire	19.58	5817.91	0.000	.997	0.003	0.000–0.001
Social class†	-1.02	0.39	6.936	.008	0.36	0.17–0.77

*Female was the reference category. †Higher class was the reference category.

roll Rating Scale cutoff for depression (10) was performed to verify association of age, sex, social class, and Self-report Questionnaire with the Global scores. Sex ($OR=2.46$) and social class ($OR=0.36$) were significantly associated with Carroll Rating Scale score (Table 4). Subsequently, the same analysis was performed for the Carroll Rating Scale Global score without the three sex-associated items previously established in Table 3, and applying the same cutoff. With this strategy, no association between sex and Carroll Rating Scale score was observed (Table 5).

TABLE 5
LOGISTIC REGRESSION ANALYSIS OF CARROLL RATING SCALE: AGE, SELF-REPORTING QUESTIONNAIRE, SEX, AND SOCIAL CLASS WITHOUT THREE SEX-ASSOCIATED ITEMS

Variable	Beta	SE	Wald	<i>p</i>	OR	95% CI
Age, yr.	-0.005	0.03	0.030	.863	1.00	0.94-1.06
Sex*	0.59	0.32	3.512	.061	1.81	0.97-3.37
Self-reporting Questionnaire	19.78	5891.42	0.000	.997	0.004	0.000-0.001
Social class†	-0.80	0.35	5.077	.024	0.45	0.23-0.90

Note.—Three deleted items are listed in Table 3. *Female was the reference category. †Higher class was the reference category.

DISCUSSION

In the present study, Carroll Rating Scale global scores, answered after the recollection of a stressful event, were significantly higher for women than for men. Depression scores higher than the cutoff of 10 did not express current symptomatology, though men's mean was approximately 16 and women's 22, since this is a nonclinical sample. Almost 50% of the 52 items of the Carroll Rating Scale showed significant association with respondent's sex.

The hypothesis that some questionnaires meant to screen depression might have included sex-biased items could be shown after the removal of the identified items from the Carroll Rating Scale global score, when the association of sex with scores above 10 was controlled. Even in a nonclinical sample, women's behavior, cognitive styles, and coping strategies were related with main symptoms used to define depression and could generate an assessment bias (Wilhelm & Parker, 1993; Salokangas, *et al.*, 2002). On the other hand, no significant sex differences on self-report of symptoms of depression have also been reported (Bogner & Gallo, 2004). Eliminating sex-associated items by studying clinically depressed people with a control group, establishing the diagnoses by psychiatrists, and evaluating if the questionnaire was still in accord could be an interesting proposal for future research.

Items that showed significantly stronger association with depression in women in the logistic model were related to behavior and emotions generally attributed to females. Women were perhaps more eloquent than men and

reported more sadness (Newmann, 1987; Mirowsky & Ross, 1995); for example, crying is considered a woman's trait (Lombardo, Cretser, Lombardo, & Mathis, 1983; Williams & Morris, 1996). In a study measuring depressive symptoms by means of the Beck Depression Inventory, crying was common for women but not for men, and the authors interpreted this finding as deriving from greater cultural permission for women to cry (Hammen & Padesky, 1977). Respondents' sex was the most important demographic factor associated with physical symptoms in a sample of 1,000 patients in a primary care institute for mental disorders (Kroenke & Spitzer, 1998). Women reported more physical and somatoform symptoms, despite controlling for other psychiatric symptoms. A study in a sample of medical students showed that difficulty maintaining sleep was associated with "being women" (Loayza, Ponte, Carvalho, Pedrott, Nunes, Souza, Zanette, Voltolini, & Chaves, 2001). Most men claimed to appear calm on the outside during the occurrence of their saddest or most difficult experience, which may be related to suggestions made by other authors that men do not freely express their feelings (Gilligan, 1982; Nolen-Hoeksema & Girgus, 1994; Moller-Leimkuhler, 2002).

The Carroll Rating Scale Global mean scores among men and women who scored above the cutoff to detect depression did not show significant differences before or after the removal of the three sex-associated items. However, mean, standard deviation, and variation of the Global score may be not the best way to demonstrate the hypothesis under investigation: by making such comparisons, one assumes more than a reductionistic view that higher rates of depression in women can be described by questionnaires and means, variance, and standard deviation. Nevertheless, there is something about the female communication style to express feelings that can "sound" more like depression than the male style.

The present results showed an association of social class with Carroll Rating Scale Global score < 10. A protective effect of higher social class was found. Higher rates of depression and anxiety associated with lower socioeconomic status are known (Bebbington, Hurry, Tennant, Sturt, & Wing, 1981; Hodiamont, Peer, & Syben, 1987; Kessler, *et al.*, 1994).

This is an exploratory study using the paradigm of recalling a stressful life event. It was not intended that the results would generalize to major depression, but that may be another interesting way to evaluate the intriguing issue of the sex differences in rating symptoms of depression. Present subjects of the sample defined their maximally disturbing experience according to their own criteria, and the assumption was that they considered the extent of suffering as the main descriptor of the experience. The recalling and reliving of such experiences induced significant changes in cardiovascular activity as well as decreased lymphocyte mitogenic reactivity (Knapp, *et al.*,

1992). Given the homogeneity of the present sample, it is unlikely that the subjects experienced extremely divergent stressful life experiences. It is important to point out that the interest lay in the reaction of recalling the event and not the stressful event itself. Finally, it is worth considering that, according to considerable evidence provided by studies with interrespondent and test-retest analyses, the data obtained on structured life-event inventories lack reliability (Kessler & Wethington, 1991).

Some limitations may have interfered with the outcome of the present study. Men may have presented more recall bias because their memory of the depressogenic event could be faultier and not so effective. Men remember their previous depressive episodes less than women in clinical samples with depressive patients (Ernst & Angst, 1992; Wilhelm & Parker, 1994). On the other hand, no difference in the quality of symptom recall of depressed men and women was observed (Kuehner, 2003). The limitation of a sample of convenience composed of higher social class students restricts the external validity of this study for the general population. Individuals with higher Self-report Questionnaire scores were included to increase the variability of the sample so that it was more similar to the actual population of college students. The possibility that some subjects from this sample could have had mental symptoms in the past should not have influenced the present results because they were young university students actually carrying out their regular activities and did not present with any academic problems.

The lack of fundamental understanding of the nature of the difference in rates of depression for men and women motivates exploratory studies in nonclinical samples. By removing only three sex-related items, the association between sex and depression disappeared. Certainly, this investigation was not planned to explain the consistent finding of higher prevalence of depression among women, but it is an important exploratory study of the overlap between stereotypical views of women and criteria for depression.

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