

## Tilburg University

### **Gender differences in emotion regulation and relationships with perceived health in patients with rheumatic arthritis**

van Middendorp, H.; Geenen, R.; Sorbi, M.J.; Hox, J.J.; Vingerhoets, A.J.J.M.; van Doornen, L.J.P.; Bijlsma, J.W.J.

*Published in:*  
Women & Health

*Publication date:*  
2005

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication in Tilburg University Research Portal](#)

*Citation for published version (APA):*

van Middendorp, H., Geenen, R., Sorbi, M. J., Hox, J. J., Vingerhoets, A. J. J. M., van Doornen, L. J. P., & Bijlsma, J. W. J. (2005). Gender differences in emotion regulation and relationships with perceived health in patients with rheumatic arthritis. *Women & Health, 42*(1), 75-97.

#### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

#### **Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

# Gender Differences in Emotion Regulation and Relationships with Perceived Health in Patients with Rheumatoid Arthritis

Henriët van Middendorp, PhD  
Rinie Geenen, PhD  
Marjolijn J. Sorbi, PhD  
Joop J. Hox, PhD  
Ad J. J. M. Vingerhoets, PhD  
Lorenz J. P. van Doornen, PhD  
Johannes W. J. Bijlsma, PhD, MD

**ABSTRACT.** Emotion regulation has been associated with perceived health in rheumatoid arthritis, which is diagnosed three times more often in women than men. Our aim was to examine gender differences in styles of emotion regulation (ambiguity, control, orientation, and expression) and gender-specificity of the associations between emotion

---

Henriët van Middendorp, Rinie Geenen, Marjolijn J. Sorbi, and Lorenz J. P. van Doornen are affiliated with the Department of Health Psychology, and Joop J. Hox is affiliated with the Department of Methodology and Statistics, all at Utrecht University, The Netherlands.

Ad J. J. M. Vingerhoets is affiliated with the Department of Health and Clinical Psychology, Tilburg University, The Netherlands.

Johannes W. J. Bijlsma is affiliated with the Department of Rheumatology and Clinical Immunology, University Medical Center Utrecht, The Netherlands.

Address correspondence to: Henriët van Middendorp, PhD, Department of Health Psychology, Utrecht University, Heidelberglaan 1, P.O. Box 80.140, 3508 TC Utrecht, The Netherlands (E-mail: H.vanMiddendorp@fss.uu.nl).

The authors would like to thank all rheumatologists and rheumatology nurses of the Arthritis Research Foundation Utrecht (SRU) for recruitment of participants.

This study was financially supported by the Dutch Arthritis Association.

regulation and perceived health (psychological well-being, social functioning, physical functioning, and disease activity) in 244 female and 91 male patients with rheumatoid arthritis. Women reported more emotional orientation than men, but did not differ from men with regard to ambiguity, control, and expression. Structural equation modelling showed that relationships between emotion regulation and perceived health were more frequent and stronger for women than men. This held especially for the affective dimension of health, while associations were similar for both women and men with regard to social and physical functioning. Only for women, the association between ambiguity and disease activity was significant, which appeared to be mediated by affective functioning. The observations that women are more emotionally oriented than men and that emotion regulation is more interwoven with psychological health in women than men, support the usefulness of a gender-sensitive approach in research and health care of patients with rheumatoid arthritis. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2005 by The Haworth Press, Inc. All rights reserved.]

**KEYWORDS.** Rheumatoid arthritis, gender differences, gender, emotion regulation, alexithymia, emotional disclosure

### INTRODUCTION

Gender differences in health, its determinants, and gender-sensitive health care have been receiving attention in recent years. Instead of treating gender as a covariate that is controlled for in analyses, gender is also a topic of interest in itself (Bekker, 2003; Moerman & Van Mens-Verhulst, 2004). Men and women differ with respect to the prevalence of diseases such as cardiovascular and autoimmune diseases, the sensory perception of pain, symptom report, illness behaviour, health care use, and treatment response (Gijsbers van Wijk et al., 1999; Keogh et al., 2005; Pinn, 2003). A gender bias in health care has been reported, showing that differences in diagnosis and treatment occur based on the gender of the patient (Hoffmann & Tarzian, 2001; Meeuwesen et al., 2002; Robinson et al., 2001).

Multiple and interrelated determinants of gender differences in objective and subjective health characteristics have been proposed: biological (genetic and hormonal), sociocultural (socio-economic, age,

work, family arrangement), health behavioural (smoking, alcohol consumption, diet, exercise), and psychological (life events, stress, personality, mood, coping) (Bekker, 2003; Denton et al., 2004; Verbrugge, 1985). The 'differential exposure hypothesis' proposes that health differences are caused by men and women being exposed to different sociocultural, behavioural, and psychological risk factors in their lives, while the 'differential vulnerability hypothesis' proposes that men and women react differently to the same sociocultural, behavioural, and psychological determinants of health (Denton et al., 2004; Tamres et al., 2002). Although psychological variables are considered to play a role in determining health in both women and men, whether the direction and strength of relationships are different for women and men has rarely been studied. Some studies have suggested that psychological influences on health are stronger for women than for men (Denton et al., 2004; Malatesta & Culver, 1993; Williams & Barry, 2003).

Rheumatoid arthritis is a chronic inflammatory pain condition affecting the joints. The disease is diagnosed three times more often in women than in men. The consequences of pain, joint destruction, and increased disability include limited ability to perform activities of daily living, work and leisure time activities, dependence upon other people, and uncertainty about the future. Individuals differ in the severity of disease and the degree to which its consequences affect how they perceive their health in the areas of disease activity and affective, social, and physical functioning (WHO, 2001). Psychosocial variables such as stressful life events, coping, social support, and illness cognitions have been shown to affect perceived and actual health in patients with rheumatoid arthritis (Evers et al., 2003; Zautra et al., 1999). Emotion regulation has been proposed as a potentially relevant addition to these psychological determinants of health. Emotion regulation involves the processes that individuals use to determine which emotions they have, when they have them, and how they experience and express these emotions (Gross, 1998). Examples of ways to regulate emotions include the ability to distinguish and describe emotions, the intensity of emotional experiences, and the tendency to control or express emotions. Individual differences in styles of emotion regulation have been shown to be related to how individuals perceive their health, both cross-sectionally and prospectively, and in patients with rheumatoid arthritis (Gohm & Clore, 2002; Solano et al., 2002; van Middendorp et al., 2005). The appraisal of one's health will influence, among other things, help-seeking behaviour, symptom report, and medication adherence, and may as a result indirectly influence somatic health.

The way men and women experience and regulate their emotions is shaped by both biological and socialization processes (Kring & Gordon, 1998; Tamres et al., 2002). Gender differences in emotion regulation, although small on average, have been reported. Compared to men, women use more emotion regulation strategies (Garnefski et al., 2004; Stanton, Kirk et al., 2000), express their emotions more often (Kring et al., 1994; Mendes et al., 2003), experience their emotions more intensely (Gross & John, 1998; Williams & Barry, 2003), and show greater emotional awareness (Barrett et al., 2000). No consistent gender differences have been found regarding alexithymia, that is, difficulty experiencing and describing emotions, and emotional control, that is, keeping emotions inside (Bagby et al., 1994; Fischer et al., 1993; Roger & Najarian, 1989; Thayer et al., 2003).

The aim of the present study was to examine gender differences in styles of emotion regulation and gender-specificity of relationships between styles of emotion regulation and perceived health in patients with rheumatoid arthritis. In line with psychological variables generally having stronger influences on perceived health in women than men, we hypothesize that for women, who are on average more emotionally oriented, emotion regulation styles are more strongly associated with perceived health than for men. This question has hardly been explored. Indeed only a single study showed that more and different associations exist for women than for men between somatic symptoms and emotional traits, such as the tendency to keep anger inside or to express it (Malatesta & Culver, 1993). Knowledge on the potential importance of emotion regulation for health in women versus men may indicate gender-specific risk profiles and the need for a gender-sensitive health care approach in patients with rheumatoid arthritis.

## **METHODS**

### ***Participants and Procedure***

Participants were recruited by rheumatologists and rheumatology nurses of the rheumatology divisions of seven hospitals in the Utrecht area, The Netherlands, participating in the Utrecht Rheumatoid Arthritis Cohort study group. A letter with information on the study and a questionnaire booklet were handed out to patients during their regular check-up, between March and August 2001. Inclusion criteria were a minimum age of 18 years and a diagnosis of rheumatoid arthritis ac-

according to American College of Rheumatology criteria (Arnett et al., 1988). The questionnaire booklet consisted of eight questionnaires that took approximately two to three hours to complete. Of the 514 questionnaire booklets that were handed out, 65% were returned completed. The study was approved by the research and ethics committee of the University Medical Center Utrecht.

Participants were 244 female and 91 male outpatients with rheumatoid arthritis. This ratio (3:1) corresponds with the known sex distribution of rheumatoid arthritis. Demographic and disease-related characteristics of men and women are summarized in Table 1.

Men were on average older ( $t(200) = 2.44, p < .05$ ) and more likely to have paid employment than women ( $\chi^2(1) = 3.84, p = .05$ ). More men than women reported to have cardiovascular disease ( $\chi^2(1) = 6.80, p < .01$ ). With regard to medication use, women reported to have used more analgesics ( $\chi^2(1) = 6.39, p < .05$ ) and sleep medication ( $\chi^2(1) = 6.33, p < .05$ ) in the four weeks preceding their participation in the study than men. No significant gender differences were found for the other variables (Table 1).

### ***Instruments***

To be able to examine a parsimonious model of associations between emotion regulation and health with adequate power, principal component analyses were used to summarize aspects of emotion regulation and perceived health. Factor scores were computed by calculating the mean of the standardized scores of scales with significant and primary loadings on the factor (van Middendorp et al., 2005).

*Emotion Regulation.* Four aspects of emotion regulation were extracted from fourteen scales of four psychometrically sound questionnaires on emotion regulation in 335 patients, encompassing a broad array of emotion regulation concepts that are considered relevant within the field: *ambiguity*, *control*, *orientation*, and *expression* (van Middendorp et al., 2005). These four styles represent how individuals in general respond to emotional situations. Table 2 provides descriptions of the four styles of emotion regulation, the scales of which they are composed, two exemplary items per scale, and the internal consistencies in the current sample.

*Perceived Health.* Five aspects of perceived health were extracted from sixteen scales of four psychometrically sound instruments to assess a wide domain of health in 335 patients: *negative affect*, *positive af-*

TABLE 1. Demographic and disease-related characteristics of female and male patients with rheumatoid arthritis

		Women (n = 244)	Men (n = 91)	<i>p</i> <sup>a</sup>
Age	Mean (SD)	56.8 (14.0)	60.4 (11.0)	.02
	Range	19-87	27-80	
Disease duration in years	Mean (SD)	12.6 (11.3)	11.0 (10.2)	.23
	Range	0.2-52	0.2-60	
		%	%	
Marital status				.60
	Single/ unmarried	10	8	
	Married/living together	74	81	
	Divorced	5	4	
	Widowed	11	7	
Educational level				.20
	Primary education	18	16	
	Secondary education	66	60	
	Tertiary education	16	24	
Current paid employment				.05
	Being housekeeper	63	8	.000
Reason for not working				
	Sick-leave	3	3	1.00
	Disability pension	37	39	.77
	(Early) Retirement	34	55	.004
	Unemployed	3	0	.31
Comorbidity				.81
	Lung disease	7	7	.81
	Cardiovascular disease	8	18	.009
	Diabetes	3	8	.07
	Cancer	2	1	1.00
	Other comorbidity	18	18	.86

	Women (n = 244)	Men (n = 91)	<i>p</i> <sup>a</sup>
Medication use RA	99	99	1.00
Analgesics	47	32	.01
NSAIDs <sup>b</sup>	78	74	.46
DMARDs <sup>b</sup>	89	91	.54
Glucocorticoids	29	27	.76
Sleep medication	18	7	.01
Homeopathic medication	9	10	.75
Treatment-related medication <sup>b</sup>	33	44	.06
Medication use non-RA <sup>c</sup>	49	45	.54

Note. <sup>a</sup> For age and disease duration: *t*-tests; for all other variables:  $\chi^2$ -tests

<sup>b</sup> NSAIDs = nonsteroidal anti-inflammatory drugs; DMARDs = disease-modifying antirheumatic drugs; Treatment-related medication = medication such as calcium, omeprazol, and folic acid to counteract possible side effects of the antirheumatic medications

<sup>c</sup> Medication for other conditions than rheumatoid arthritis, such as osteoporosis, diabetes, or hypertension

*fect, social functioning, physical functioning, and disease activity* (van Middendorp et al., 2005). Table 3 provides descriptions of the five aspects of perceived health, the scales of which they are composed, two exemplary items per scale, and the internal consistencies in the current sample.

### **Statistical Analyses**

Data were screened for outliers and deviations from normality, linearity, and homoscedasticity, according to the criteria of Tabachnick and Fidell (2001). The skewness of the factor scores of emotion regulation and perceived health were between  $-0.30$  for social functioning and  $1.03$  for negative affect. Because the distributions of variables were normal or nearly normal and considering the drawbacks of changing the data, we did not transform variables or remove cases from the data set, especially since any adaptations made according to these criteria did not change the results.

To examine gender differences in the use of emotion regulation styles and in perceived health, analyses of variance were conducted with SPSS 11.5 for Windows. Age was included as a covariate in these analyses, because the men and women differed in age, which was related to both emotion regulation and perceived health. To quantify the size of gender differences, effect sizes were computed, that is, the dif-



TABLE 2. Descriptions of the four emotion regulation styles, the scales of which they are composed, two exemplary items for each scale, and internal consistencies (Cronbach's  $\alpha$ )

Emotion regulation style		
Scale	Description and exemplary items	$\alpha$
<i>Ambiguity: Difficulty identifying and describing emotions (alexithymia) and being ambivalent on expressing emotions</i>		
Difficulty identifying- feelings (TAS-20)-	I am often confused about what emotion I am feeling I am often puzzled by sensations in my body	.81
Ambivalence over emotional- expression (AEQ)-	Often I'd like to show others how I feel, but something seems to be holding me back - I feel guilty after I have expressed anger to someone	.94
Difficulty describing- feelings (TAS-20)-	It is difficult for me to find the right words for my feelings - I find it hard to describe how I feel about people	.73
Masking (FEFS)-	The way I feel is different from how others think I feel - I may deceive people by being friendly when I really dislike them	.73
<i>Control: Keeping feelings inside and trying to restrain feelings and be rational when emotions are experienced</i>		
Emotional expression-in- (SAQ-N)-	When I feel afraid or worried, I hide my worries When I feel angry or very annoyed, I smother my feelings	.58
Emotional control (SAQ-N)-	When I feel unhappy or miserable, I control my behaviour - When I feel afraid or worried, I keep quiet	.65
Rationality (SAQ-N)-	I try to act rational, so I do not need to respond emotionally - If someone hurts me or my feelings, I try to suppress my feelings	.80
Understanding (SAQ-N)-	If someone acts against your needs, do you nevertheless try to understand him? - Do you try to understand others even if you do not like them?	.65

Emotion regulation style		
Scale	Description and exemplary items	$\alpha$
<i>Orientation: Attending to and intensely experiencing emotions, and valuing emotions in daily life and decision making</i>		
Externally oriented thinking- (TAS-20)	It is difficult for me to find the right words for my feelings - I find examination of my feelings useful in solving personal problems	.58
Impulse intensity (FEFS)	I experience my emotions very strongly - There have been times when I have not been able to stop crying even though I tried to stop	.64
Emotionality (SAQ-N)	In important situations, I trust my feelings - My behaviour is influenced by my emotions	.71
<i>Expression: The expression of both negative and positive emotions towards others</i>		
Negative expressivity- (FEFS)	Whenever I feel negative emotions, people can easily see what I am feeling - I always express disappointment when things don't go as I'd like them to	.71
Emotional expression-out- (SAQ-N)	When I feel angry or very annoyed, I let others see how I feel - When I feel unhappy or miserable, I say what I feel	.86
Positive expressivity (FEFS)	When I'm happy, my feelings show - Watching television or reading a book can make me laugh out loud	.84

*Note.* TAS-20: Toronto Alexithymia Scale 20 (Bagby et al., 1994; Trijsburg et al., 1996); AEQ: Ambivalence over Emotional Expressiveness Questionnaire (King & Emmons, 1990); FEFS: Five Expressivity Facet Scales (Gross & John, 1998); SAQ-N: Self-Assessment Questionnaire Nijmegen (Bleiker et al., 1993)

ference between means of women and men in standard deviation units. Effect sizes of 0.2, 0.5, and 0.8 are considered small, medium, and large, respectively (Cohen, 1988).

Demographic, disease- or medication-related variables which were significantly related to at least one style of emotion regulation and one perceived health variable in men or women were controlled statistically when analyzing relations between emotion regulation and perceived health. Age, educational level, disease duration, and comorbidity were thus included in the models as control variables.

TABLE 3. Descriptions of the five aspects of perceived health, the scales of which they are composed, two exemplary items for each scale, and internal consistencies (Cronbach's  $\alpha$ )

Perceived health aspect		
Scale	Description and exemplary items	$\alpha$
<i>Negative affect: A depressed and tense mood</i>		.91
Depression (POMS; past-month)-	I have been feeling sad	.90
	I have been feeling unhappy	
Tension (POMS; past-month)-	I have been feeling nervous	.88
	I have been feeling tense	
Anxiety (IRGL; past-month)-	I worry too much about things that are not that important	.88
	- There are thoughts that I find difficult to let go	
Anger (POMS; past-month)-	I have been feeling bad-tempered	.89
	I have been feeling angry	
Depressed mood (IRGL; past week)-	I have been feeling gloomy	.91
	I have been feeling depressed	
<i>Positive affect: An energetic and cheerful mood</i>		.77
Vigor (POMS; past month)-	I have been feeling active	.80
	I have been feeling energetic	
Cheerful mood (IRGL; past week)-	I have been feeling happy	.91
	I have been feeling cheerful	
<i>Social functioning: Actual and perceived social support</i>		.59
Mutual visits (IRGL; past-six months)-	Friends and family visit me	.72
	I visit friends or family	
Perceived support (IRGL; past six months)-	When I feel tense or under pressure, there is someone who helps me	.88
	- When I experience something nice, there is someone with whom I can share it	
Actual support (IRGL; past six months)-	Others come to me for support and advice	.73
	I talk confidentially with others	
<i>Physical functioning: Physical mobility and dexterity and the ability to perform daily physical activities</i>		.90
Self-care (IRGL; past-month)-	I was able to button up my blouse/shirt	.91
	I was able to open a can	
Disability (HAQ; past-week)-	Were you able to wash your hair?	.92
	Were you able to do your daily shopping?	
Mobility (IRGL; past-month)-	Because of my health, I spent most of the day indoors	.91
	- I was able to go up the stairs	

Perceived health aspect		
Scale	Description and exemplary items	$\alpha$
<i>Disease activity: Pain, morning stiffness, and the self-assessed condition of the joints</i>		
Pain (IRGL; past month)-	During the past month, I was troubled by one or more swollen (and possibly painful) joints - During the past month, my morning stiffness (from the moment of awakening) lasted on average: [more than two hours; 1 to 2 hours; 30 minutes to 1 hour; less than 30 minutes; I have had no morning stiffness]	.87
Disease activity (RADAI;-	In general, how active has your arthritis been over different time spans) the past 6 months? - How much arthritis pain do you feel today?	.86

*Note.* POMS: Profile of Mood States (Wald & Mellenbergh, 1990); IRGL: Impact of Rheumatic Diseases on General Health and Lifestyle (Huiskes et al., 1990); HAQ: Health Assessment Questionnaire (Bijlsma et al., 1990); RADAI: Rheumatoid Arthritis Disease Activity Index (Stucki et al., 1995)

To investigate the associations between styles of emotion regulation and perceived health, structural equation modelling (SEM) with the AMOS program was applied (Arbuckle & Wothke, 1999; van Middendorp et al., 2005). The model was tested for women and men separately (Arbuckle & Wothke, 1999). Residual variance terms were added to all emotion regulation styles and perceived health aspects in the model. These represented all of the variance of the factor that could not be explained by the variables in the model. The residual variance terms of the emotion regulation styles and of the perceived health aspects were allowed to be intercorrelated, as were the control variables. Regression lines from the control variables (age, educational level, disease duration, and comorbidity) to the styles of emotion regulation and perceived health aspects were maintained in the models only when at least a marginally significant relationship ( $p < .10$ ) for one of the genders was found. The models for women and men thus had identical control variables and specified regression lines to the factors.

The models were tested stepwise, starting with a model in which all regression weights between emotion regulation and perceived health were constrained to zero (Arbuckle & Wothke, 1999). At each step, the regression weight between the factor of emotion regulation and the factor of perceived health with the highest modification index (indicating the most significant deviation from zero) was no longer constrained to

zero. Then the model was tested again, with that regression weight being estimated. This procedure was continued until the testing resulted in a non-significant Chi-square value ( $\chi^2$ ), and further adjustments did not improve the model according to model comparison. Two general fit indices were examined: the Root Mean Square Error of Approximation (RMSEA) and the Tucker-Lewis Index (TLI) (Hox & Bechger, 1998). If the model fit the data well, the RMSEA was smaller than 0.05, and the TLI was 0.95 or higher. The final models were multivariate multiple regression models, with nonsignificant paths constrained to zero. To examine whether discrepancies were observed in associations with perceived health between the scales belonging to one emotion regulation style, analyses were repeated with each separate scale instead of its factor. These analyses showed that all of the associations of scales contributing to one factor only showed marginal differences in the strength of associations (data not shown).

Since the sample sizes for men and women differed considerably (244 women, 91 men), relationships might become statistically significant in the sample of women but not men, even with similar regression coefficients. To test whether the regression weights between emotion regulation styles and perceived health aspects were significantly different for women and men, men and women had to be tested simultaneously within a model with exactly the same paths drawn. To detect significant differences in the regression coefficients for men and women, we had AMOS compute a table of critical ratios for differences among all pairs of regression coefficients. At the  $\alpha = .05$  level, associations between the same two variables for men and women could be considered different if the critical ratio was higher than 1.96.

In post hoc analyses, we examined whether associations of emotion regulation styles with somatic functioning were explained by psychosocial functioning by testing a mediational model according to the procedures of Baron and Kenny (1986).

## **RESULTS**

### ***Emotion Regulation***

A gender difference was found for orientation, reflecting that women had higher scores than men for attending to emotions, valuing emotions in daily life, and experiencing emotions intensely ( $F(1, 320) = 30.05, p$

< .01). The magnitude of the effect size was medium ( $d = 0.69$ ). Ambiguity, control, and expression showed no gender differences (Table 4).

### **Perceived Health**

Men reported better physical functioning than women ( $F(1, 323) = 21.79, p < .01$ ), an effect size of medium magnitude ( $d = 0.59$ ) (Table 5). Negative affect, positive affect, social functioning, and disease activity showed no gender differences.

### **Relationships Between Emotion Regulation and Perceived Health**

For both women and men, a good-fitting model of the relationships between the styles of emotion regulation and perceived health variables was achieved:  $\chi^2(33) = 34.44, p = .40$  for the model of women (Figure 1A);  $\chi^2(37) = 29.77, p = .80$  for the model of men (Figure 1B). The goodness-of-fit measures (TLI = 1.00, RMSEA = 0.01 for women, TLI = 1.02, RMSEA = 0.00 for men) showed that both models were a good fit to the data.

Intercorrelations, which are shown on the left side of the figures for emotion regulation, and on the right side for perceived health, were maintained in the final models. Significance and magnitude of correlations were about the same for women and men.

TABLE 4. Means ( $M$ ) and standard deviations ( $SD$ ) of styles of emotion regulation of female and male patients, and significance ( $p$ ) and effect sizes ( $d$ ) of univariate analyses of variance of gender differences with age as covariate

	♀		♂		$p$	$d$
	$M$	( $SD$ )	$M$	( $SD$ )		
Ambiguity	-.06	(.78)	.16	(.76)	.07	0.24
Control	-.03	(.78)	.08	(.67)	.51	0.10
Orientation	.14	(.75)	-.39	(.64)	.00	0.69
Expression	.04	(.80)	-.12	(.80)	.33	0.13

*Note.* The means are standardized scores of scales loading on the variable; positive mean scores on all four styles represent frequent use of that specific style of emotion regulation, while negative scores represent infrequent use of that style; the effect size ( $d$ ) reflects the difference between estimated, age-adjusted, means of women and men in standard deviation units; effect sizes of 0.2, 0.5, and 0.8 are considered small, medium, and large, respectively.

TABLE 5. Means (*M*) and standard deviations (*SD*) of perceived health variables of female and male patients, and significance (*p*) and effect sizes (*d*) of univariate analyses of covariance of gender differences with age as covariate

	♀		♂		<i>p</i>	<i>d</i>
	<i>M</i>	( <i>SD</i> )	<i>M</i>	( <i>SD</i> )		
Negative affect	-.01	(.85)	.00	(.85)	.84	0.02
Positive affect	.02	(.91)	-.04	(.88)	.94	0.01
Social functioning	.04	(.71)	-.07	(.83)	.37	0.11
Physical functioning	-.10	(.92)	.28	(.83)	.00	0.59
Disease activity	.06	(.94)	-.11	(1.01)	.09	0.22

*Note.* The means are standardized scores of scales loading on the variable; positive mean scores on negative affect and disease activity represent poor functioning, while positive mean scores on positive affect, social functioning, and physical functioning represent adequate functioning.

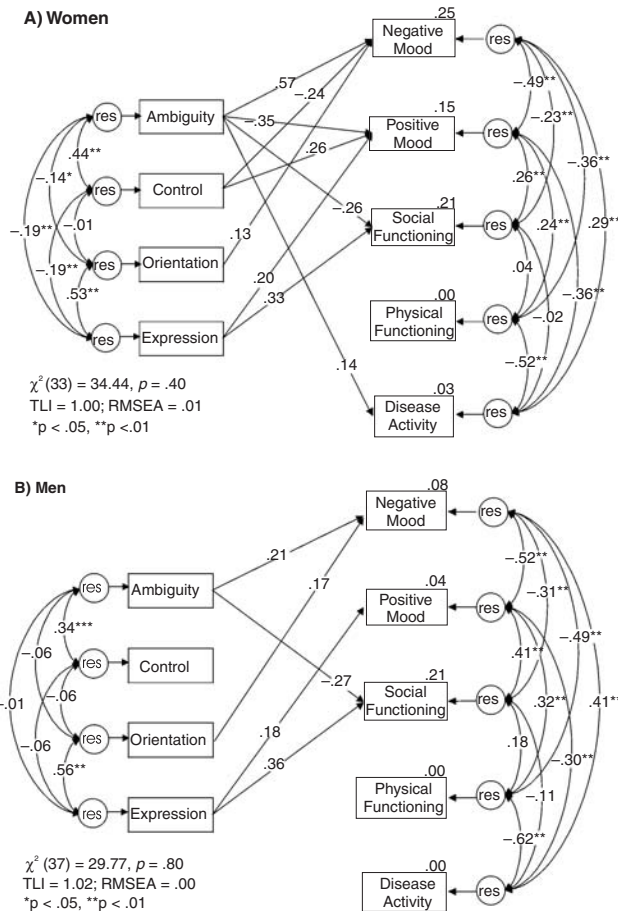
In the model of female patients (Figure 1A), nine relationships between emotion regulation and perceived health were significant. Women high in ambiguity reported worse functioning in all domains of perceived health except physical functioning. High emotional control, low orientation, and high expression were associated with better psychological well-being. High expression was also related to better social functioning. The four factors of emotion regulation explained 25% of the variance of negative affect, 15% of positive affect, 21% of social functioning, 0% of physical functioning, and 3% of disease activity in women.

Of the standardized regression weights of the model of male patients, only five were significant (Figure 1B). Men high in ambiguity and low in expression reported worse psychological well-being and social functioning. High orientation was associated with lower psychological well-being. The four factors of emotion regulation were able to explain 8% of the variance of negative affect, 4% of positive affect, 21% of social functioning, and 0% of physical functioning and disease activity in men.

### ***Significant Differences in Relationships of Men and Women***

Since more associations were significant for women than men and all relationships that were significant for men were also significant for women, the model that was found for women was used as the model in which to test significance of differences. The relationships that were

FIGURE 1. The model of (A) women and (B) men of significant relationships between factors of emotion regulation and perceived health. The double arrows at the left and right represent correlations (significance levels are indicated by asterisks). The single-headed arrows in the middle represent significant standardized regression weights (non-significant regression weights were omitted). The values above the perceived health factors represent percentages of variance accounted for by the four styles of emotion regulation. Each factor includes a residual variance term (res) to account for all of the variance that could not be explained by the predictors in the model (including the control variables). For reasons of clarity, the associations of the control variables (age, educational level, disease duration, and comorbidity) with emotion regulation and perceived health were not included in the figure. The fit of the model is represented by the chi-square value ( $\chi^2$ ), the Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA).





nonsignificant when testing the model separately for men, remained nonsignificant for men in this model. Three relationships were shown to be significantly stronger for women than men, namely the relationships between ambiguity and negative affect ( $\beta = .57$  for women,  $.22$  for men), ambiguity and positive affect ( $\beta = -.35$  for women,  $.07$  for men), and emotional control and positive affect ( $\beta = .26$  for women,  $-.13$  for men).

### *Post Hoc Analysis on Potential Mediation Path*

Emotion regulation styles were mainly related to psychological functioning. Women also demonstrated an association between the emotion regulation style ambiguity and self-assessed disease activity. To examine whether this association was explained by affective functioning, we tested a mediational model, consisting of the four emotion regulation styles to account for shared variance, a summary measure of affective functioning consisting of positive and negative affect, disease activity as the outcome variable, and the control variables. We first checked the assumptions that ambiguity was related to affective functioning ( $\beta = .43, p = .00$ ) and to disease activity ( $\beta = .21, p = .00$ ) and that affective functioning was related to disease activity ( $\beta = .40, p = .00$ ). Secondly, both the direct and indirect paths from ambiguity to disease activity were tested. The association between ambiguity and disease activity became nonsignificant ( $\beta = .04, p = .59$ ), while the associations between ambiguity and affective functioning ( $\beta = .43, p = .00$ ) and between affective functioning and disease activity ( $\beta = .39, p = .00$ ) remained significant. Thus, the mediational analysis demonstrated that the association between ambiguity and the perception of disease activity was not a direct association, but was mediated by affective functioning.

## **DISCUSSION**

Compared to men, women with rheumatoid arthritis were higher on emotional orientation and reported more and stronger relationships between emotion regulation and mainly the affective dimension of perceived health.

Regarding gender differences in emotion regulation, previous findings were replicated for three of the four strategies of emotion regulation. The absence of gender differences in ambiguity and control (Bagby

et al., 1994; Roger & Najarian, 1989) and the higher emotional orientation in women than men (Gross & John, 1998) correspond with previous research on similar constructs. The expectation for higher emotional expression in women (Kring et al., 1994) was not confirmed. This raises the question whether gender differences in emotional expression are reduced in rheumatoid arthritis. Gender differences have been demonstrated particularly in the expression of positive emotions (Gross & John, 1998; King & Emmons, 1990). We also found higher scores for women on the positive expressivity scale (these data were not shown), but this difference disappeared when orientation was controlled, as occurred in the study by Gross and John (1998). This suggests that emotional orientation is the major gender difference. The gender difference in emotional orientation in healthy populations was replicated in our patient sample, and thus seems to be an aspect of emotion regulation differentiating both healthy and chronically ill women from men.

Regarding gender-specificity of the associations between emotion regulation and perceived health, orientation did not show stronger relations with psychological well-being in women than men. Both in our patients with rheumatoid arthritis and in cancer patients (Stanton, Danoff-Burg et al., 2000), orientation was related only to higher negative affect, while in healthy populations, relationships with higher negative as well as positive affect have been reported (Gross & John, 1997; Stanton, Kirk et al., 2000). Perhaps, for both women and men, emotional orientation is a risk factor for negative affect when being confronted with the adverse consequences of a chronic disease. A complementary hypothesis is that the distress of a progressive illness makes patients more sensitive to their emotions.

Our data suggest that ambiguity especially deserves attention in women with arthritis. The association between ambiguity and negative affect in women was by far the strongest association in this study, and ambiguity was mediated by affective functioning related to self-reported disease activity in women only. Individuals with an ambiguous style of emotion regulation do not differentiate well between emotions and other psychophysical sensations. They experience their psychological and physical health as broadly negative. For patients who deal with the adverse psychological consequences of rheumatoid arthritis by ambiguity, therapeutic trials aimed at learning more beneficial strategies of emotion regulation could be considered and evaluated, as has been done in patients with coronary heart disease (Beresnevaite, 2000).

Emotional control was related to more positive affect in women only. One other study that demonstrated this association also included rela-

tively many women (Verissimo et al., 1998). Other studies including both men and women reported that control was related to more (Nyklicek et al., 2002; Solano et al., 2002) or less (Bleiker et al., 1993; Verissimo et al., 1998) psychological distress and symptom report. This apparent contradiction is probably the result of different definitions of control (Garssen & Remie, 2004). The non-expression of emotions to obtain social goals that is partly captured by our ambiguity concept has been mostly related to psychological distress. Control separated from this social aspect, such as in our study, is either not or positively related to psychological well-being. Intentionally controlling one's emotions for other than social reasons may, therefore, be beneficial for women in particular.

Expression of emotions seems equally relevant in women and men with rheumatoid arthritis. The association between expression and positive affect and social functioning perhaps reflects individual differences in the personality characteristic of extraversion. This association could also be expected from the beneficial effects of experimentally induced expression of emotions on health, which has been observed in healthy populations and patients with chronic conditions including rheumatoid arthritis (Kelley et al., 1997; Pennebaker, 1997).

Emotion regulation yielded more and stronger relationships with perceived health for women than men. This is in accordance with the one previous study dealing with this issue (Malatesta & Culver, 1993) and more generally with the observation that psychological variables are more strongly related to health in women than in men (Denton et al., 2004; Williams & Barry, 2003). The affective dimension of health explained the association between ambiguity and disease activity, in agreement with the suggestion that affective functioning more strongly influences women's self-assessment of symptoms than men's (Gijbers van Wijk et al., 1999). These findings may imply that in women emotion regulation has a stronger influence on affective state, that emotion regulation styles of women are more dependent on their affective state, or that other variables such as differences in self-report or hormonal differences affect both emotion regulation and affective state differently for women and men.

The strengths of our study were the rather large sample, the dimensional assessment of the variables, and the multivariate method of data analysis. A limitation of the present study was that the cross-sectional design did not permit conclusions as to whether emotion regulation affected perceived health or the other way around. A causal potential of emotion regulation to affect health has been suggested by longitudinal studies that have linked aspects of emotion regulation to change in health status (e.g., Solano et al., 2002; Stanton, Danoff-Burg et al.,

2000) and experimental studies showing an improved health outcome after decreasing alexithymia (Beresnevaite, 2000) and encouraging emotional disclosure (Pennebaker, 1997; Smyth, 1998). To produce insight into the causality of the relationships of the present study, research should include clinical indicators of disease activity and should measure emotion regulation and health longitudinally and repeatedly over time. Another limitation of our study was that self-reports of health hampered generalization to the physiological disease process. Perceived somatic health reflects the current disease process as well as several other past and current biological and psychosocial influences. The response rate to the study (65%) was acceptable, considering our recruitment process without the possibility to send a reminder to participants. However, as a result of this procedure, selection bias was possible and generalizability of our results to the general population of patients with rheumatoid arthritis may be somewhat limited.

Both our correlational study and experimental emotional disclosure studies (Smyth, 1998) reflect that effects of emotion regulation on perceived health may differ somewhat between men and women. Gender differences are an important issue in health care. Female patients are more likely to obtain formal health care, tend to provide more psychosocial information than male patients during a consultation and show more preference for female physicians, while female physicians pay more attention to psychosocial aspects of the complaints and use more gender-specific communication strategies than male physicians (Kerssens et al., 1997; Meeuwesen et al., 2002; Pinn, 2003). The observations that women are more emotionally oriented than men and that emotion regulation is more interwoven with mainly the affective dimension of health in women than men, support the usefulness of a gender-sensitive approach in research and health care of patients with rheumatoid arthritis.

## REFERENCES

- Arbuckle, J. L., & Wothke, W. (1999). *Amos 4.0 user's guide*. Chicago: SmallWaters Corporation.
- Arnett, F. C., Edworthy, S. M., Bloch, D. A., McShane, D. J., Fries, J. F., Cooper, N. S., et al. (1988). The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. *Arthritis and Rheumatism*, *31*, 315-324.
- Bagby, R. M., Parker, J. D., & Taylor, G. J. (1994). The twenty-item Toronto Alexithymia Scale-I: Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research*, *38*, 23-32.

- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182.
- Barrett, L. F., Lane, R. D., Sechrest, L., & Schwartz, G. E. (2000). Sex differences in emotional awareness. *Personality and Social Psychology Bulletin, 26*, 1027-1035.
- Bekker, M. H. J. (2003). Investigating gender within health research is more than sex disaggregation of data: A multi-facet gender and health model. *Psychology, Health & Medicine, 8*, 231-243.
- Beresnevaite, M. (2000). Exploring the benefits of group psychotherapy in reducing alexithymia in coronary heart disease patients: A preliminary study. *Psychotherapy and Psychosomatics, 69*, 117-122.
- Bijlsma, J. W. J., OudeHeuvel, C. H. B., & Zaalberg, A. (1990). Development and validation of the Dutch questionnaire capacities of daily life (VDF) for patients with rheumatoid arthritis. *Journal of Rehabilitation Sciences, 3*, 71-74.
- Bleiker, E. M., Van der Ploeg, H. M., Hendriks, J. H., Leer, J. W., & Kleijn, W. C. (1993). Rationality, emotional expression and control: Psychometric characteristics of a questionnaire for research in psycho-oncology. *Journal of Psychosomatic Research, 37*, 861-872.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Denton, M., Prus, S., & Walters, V. (2004). Gender differences in health: A Canadian study of the psychosocial, structural and behavioural determinants of health. *Social Science and Medicine, 58*, 2585-2600.
- Evers, A. W., Kraaimaat, F. W., Geenen, R., Jacobs, J. W. G., & Bijlsma, J. W. J. (2003). Pain coping and social support as predictors of long-term functional disability and pain in early rheumatoid arthritis. *Behaviour Research and Therapy, 41*, 1295-1310.
- Fischer, P. C., Smith, R. J., Leonard, E., Fuqua, D. R., Campbell, J. L., & Masters, M. A. (1993). Sex differences on affective dimensions: Continuing examination. *Journal of Counseling and Development, 71*, 440-443.
- Garnefski, N., Teerds, J., Kraaij, V., Legerstee, J., & Van den Kommer, T. (2004). Cognitive emotion regulation strategies and depressive symptoms: Differences between males and females. *Personality and Individual Differences, 36*, 267-276.
- Garssen, B., & Remie, M. (2004). Different concepts or different words? Concepts related to non-expression of negative emotions. In: I. Nyklicek, L. Temoshok & A. Vingerhoets (Eds.), *Emotional expression and health. Advances in theory, assessment, and clinical applications* (pp. 117-136). Washington, DC: Brunner-Routledge.
- Gijsbers van Wijk, C. M., Huisman, H., & Kolk, A. M. (1999). Gender Differences in physical symptoms and illness behavior. A health diary study. *Social Science and Medicine, 49*, 1061-1074.
- Gohm, C. L., & Clore, G. L. (2002). Four latent traits of emotional experience and their involvement in well-being, coping, and attributional style. *Cognition and Emotion, 16*, 495-518.
- Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2*, 271-299.

- Gross, J. J., & John, O. P. (1997). Revealing feelings: Facets of emotional expressivity in self-reports, peer ratings, and behavior. *Journal of Personality and Social Psychology, 72*, 435-448.
- Gross, J. J., & John, O. P. (1998). Mapping the domain of expressivity: Multimethod evidence for a hierarchical model. *Journal of Personality and Social Psychology, 74*, 170-191.
- Hoffmann, D. E., & Tarzian, A. J. (2001). The girl who cried pain: A bias against women in the treatment of pain. *Journal of Law, Medicine & Ethics, 29*, 13-27.
- Hox, J. J., & Bechger, T. M. (1998). An introduction to structural equation modeling. *Family Science Review, 11*, 354-373.
- Huiskes, C. J. A. E., Kraaimaat, F. W., & Bijlsma, J. W. J. (1990). Development of a self-report questionnaire to assess the impact of rheumatic diseases on health and lifestyle. *Journal of Rehabilitation Sciences, 3*, 65-70.
- Kelley, J. E., Lumley, M. A., & Leisen, J. C. (1997). Health effects of emotional disclosure in rheumatoid arthritis patients. *Health Psychology, 16*, 331-340.
- Keogh, E., McCracken, L. M., & Eccleston, C. (2005). Do men and women differ in their response to interdisciplinary chronic pain management? *Pain, 114*, 37-46.
- Kerssens, J. J., Bensing, J. M., & Andela, M. G. (1997). Patient preference for genders of health professionals. *Social Science and Medicine, 44*, 1531-1540.
- King, L. A., & Emmons, R. A. (1990). Conflict over emotional expression: Psychological and physical correlates. *Journal of Personality and Social Psychology, 58*, 864-877.
- Kring, A. M., & Gordon, A. H. (1998). Sex differences in emotion: Expression, experience, and physiology. *Journal of Personality and Social Psychology, 74*, 686-703.
- Kring, A. M., Smith, D. A., & Neale, J. M. (1994). Individual differences in dispositional expressiveness: Development and validation of the Emotional Expressivity Scale. *Journal of Personality and Social Psychology, 66*, 934-949.
- Malatesta, C. Z., & Culver, C. (1993). Gendered health: Differences between men and women in the relation between physical symptoms and emotion expression behaviors. In H. C. Traue & J. W. Pennebaker (Eds.), *Emotion, inhibition, and health* (pp. 116-144). Seattle, WA: Hogrefe & Huber Publishers.
- Meeuwesen, L., Bensing, J., & Van den Brink-Muinen, A. (2002). Communicating fatigue in general practice and the role of gender. *Patient Education and Counseling, 48*, 233-242.
- Mendes, W. B., Reis, H. T., Seery, M. D., & Blascovich, J. (2003). Cardiovascular correlates of emotional expression and suppression: Do content and gender context matter? *Journal of Personality and Social Psychology, 84*, 771-792.
- Moerman, C. J., & Van Mens-Verhulst, J. (2004). Gender-sensitive epidemiological research: Suggestions for a gender-sensitive approach towards problem definition, data collection and analysis in epidemiological research. *Psychology, Health & Medicine, 9*, 41-52.
- Nyklicek, I., Vingerhoets, A., & Denollet, J. (2002). Emotional (non-)expression and health: data, questions, and challenges. *Psychology and Health, 17*, 517-528.
- Pennebaker, J. W. (1997). Health effects of the expression (and non-expression) of emotions through writing. In A. Vingerhoets, F. Van Bussel & J. Boelhouwer (Eds.), *The (non)expression of emotions in health and disease* (pp. 267-278). Tilburg: Tilburg University Press.

- Pinn, V. W. (2003). Sex and gender factors in medical studies: Implications for health and clinical practice. *Journal of the American Medical Association*, 289, 397-400.
- Robinson, M. E., Riley, J. L., 3rd, Myers, C. D., Papas, R. K., Wise, E. A., Waxenberg, L. B., et al. (2001). Gender role expectations of pain: Relationship to sex differences in pain. *Journal of Pain*, 2, 251-257.
- Roger, D., & Najarian, B. (1989). The construction and validation of a new scale for measuring emotion control. *Personality and Individual Differences*, 10, 845-853.
- Smyth, J. M. (1998). Written emotional expression: Effect sizes, outcome types, and moderating variables. *Journal of Consulting and Clinical Psychology*, 66, 174-184.
- Solano, L., Costa, M., Temoshok, L., Salvati, S., Coda, R., Aiuti, F., et al. (2002). An emotionally inexpressive (Type C) coping style influences HIV disease progression at six and twelve month follow-ups. *Psychology and Health*, 17, 641-655.
- Stanton, A. L., Danoff-Burg, S., Cameron, C. L., Bishop, M., Collins, C. A., Kirk, S. B., et al. (2000). Emotionally expressive coping predicts psychological and physical adjustment to breast cancer. *Journal of Consulting and Clinical Psychology*, 68, 875-882.
- Stanton, A. L., Kirk, S. B., Cameron, C. L., & Danoff-Burg, S. (2000). Coping through emotional approach: Scale construction and validation. *Journal of Personality and Social Psychology*, 78, 1150-1169.
- Stucki, G., Liang, M. H., Stucki, S., Bruhlmann, P., & Michel, B. A. (1995). A self-administered rheumatoid arthritis disease activity index (RADAI) for epidemiologic research. Psychometric properties and correlation with parameters of disease activity. *Arthritis and Rheumatism*, 38, 795-798.
- Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). Boston, MA: Allyn and Bacon.
- Tamres, L. K., Janicki, D., & Helgeson, V. S. (2002). Sex differences in coping behavior: A meta-analytic review and an examination of relative coping. *Personality and Social Psychology Review*, 6, 2-30.
- Thayer, J. F., Rossy, L. A., Ruiz-Padial, E., & Johnsen, B. H. (2003). Gender differences in the relationship between emotional regulation and depressive symptoms. *Cognitive Therapy and Research*, 27, 349-364.
- Trijsburg, W., Passchier, J., & Duijvenvoorden, H. (1996). *De Toronto Alexithymia Schaal (Dutch translation)*. Rotterdam, The Netherlands: Erasmus Universiteit, afdeling Medische Psychologie & Psychotherapie.
- van Middendorp, H., Geenen, R., Sorbi, M. J., Hox, J. J., Vingerhoets, A. J. J. M., van Doornen, L. J. P., et al. (2005). Styles of emotion regulation and their associations with perceived health in patients with rheumatoid arthritis. *Annals of Behavioral Medicine*, 30, 44-53.
- Verbrugge, L. M. (1985). Gender and health: An update on hypotheses and evidence. *Journal of Health and Social Behavior*, 26, 156-182.
- Verissimo, R., Mota-Cardoso, R., & Taylor, G. (1998). Relationships between alexithymia, emotional control, and quality of life in patients with inflammatory bowel disease. *Psychotherapy and Psychosomatics*, 67, 75-80.
- Wald, F. D., & Mellenbergh, G. J. (1990). De verkorte versie van de Nederlandse vertaling van de Profile of Mood States (POMS) [The shortened version of the

- Dutch translation of the Profile of Mood States (POMS)]. *Nederlands Tijdschrift voor de Psychologie*, 45, 86-90.
- WHO (2001). *International classification of functioning, disability and health: ICF*. Geneva: World Health Organization.
- Williams, L. M., & Barry, J. (2003). Do sex differences in emotionality mediate sex differences in traits of psychosis-proneness? *Cognition and Emotion*, 17, 747-758.
- Zutra, A. J., Hamilton, N. A., Potter, P., & Smith, B. (1999). Field research on the relationship between stress and disease activity in rheumatoid arthritis. *Annals of the New York Academy of Sciences*, 876, 397-412.

