



# Hormone-treated transsexuals report less social distress, anxiety and depression

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## KEYWORDS

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## Summary

**Introduction:** The aim of the present study was to evaluate the presence of symptoms of current social distress, anxiety and depression in transsexuals.

**Methods:** We investigated a group of 187 transsexual patients attending a gender identity unit; 120 had undergone hormonal sex-reassignment (SR) treatment and 67 had not. We used the Social Anxiety and Distress Scale (SADS) for assessing social anxiety and the Hospital Anxiety and Depression Scale (HADS) for evaluating current depression and anxiety.

**Results:** The mean SADS and HADS scores were in the normal range except for the HAD-Anxiety subscale (HAD-A) on the non-treated transsexual group. SADS, HAD-A, and HAD-Depression (HAD-D) mean scores were significantly higher among patients who had not begun cross-sex hormonal treatment compared with patients in hormonal treatment ( $F = 4.362$ ,  $p = .038$ ;  $F = 14.589$ ,  $p = .001$ ;  $F = 9.523$ ,  $p = .002$  respectively). Similarly, current symptoms of anxiety and depression were present in a significantly higher percentage of untreated patients than in treated patients (61% vs. 33% and 31% vs. 8% respectively).

**Conclusions:** The results suggest that most transsexual patients attending a gender identity unit reported subclinical levels of social distress, anxiety, and depression. Moreover, patients under cross-sex hormonal treatment displayed a lower prevalence of these symptoms than patients who

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had not initiated hormonal therapy. Although the findings do not conclusively demonstrate a direct positive effect of hormone treatment in transsexuals, initiating this treatment may be associated with better mental health of these patients.

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## 1. Introduction

Transsexual patients are characterized by a strong and persistent sense of inappropriateness of their biological sex. Therefore, their perception of their physical appearance as unattractive is common, particularly before the onset of sex reassignment (SR) treatment and during the transition to the other sex (Gómez-Gil and Esteva de Antonio, 2006). The treatment for transsexualism comprises a set of hormonal and surgical procedures that imply changes to the physical appearance and function of primary and secondary sex characteristics to make the person's body as congruent with the opposite sex as possible. In male-to-female (MF) transsexuals, hormonal treatment with estrogens and antiandrogens induces breast enlargement, a female distribution of fat, and a reduction of male-pattern hair growth. In female-to-male (FM) transsexuals, hormonal treatment with testosterone encourages virilization including male-pattern hair growth, the development of male physical contours, and the cessation of uterine bleeding (Michel et al., 2001). SR surgery in MF patients involves creation of a neovagina and clitoris, often implantation of breast prostheses, and sometimes other feminizing surgeries. Surgeries available to the FM transsexual persons include mastectomy, complete hysterectomy, and construction of a neophallus (Gooren, 2011).

Preoperative transsexuals are insecure and feel unattractive because of concerns about their body image (Kraemer et al., 2008). According to our own clinical observations, the incongruent body image of transsexual patients before SR treatment as well as how they believe others perceive them is often reported as one of the main reasons for their work problems, decreased social life and fear of being judged as a sick person (Gómez-Gil and Esteva de Antonio, 2006). Moreover, in patients who have initiated transition late, prior hormonal effects on the skeleton and vocal cords cannot be reversed with cross-sex hormonal therapy (Gooren, 2011). Furthermore, the surgical treatment is not covered by the health services in most countries. Therefore, many patients cannot undergo or complete hormonal or surgical SR. Additionally, expectation about physical appearance and life after SR may be unrealistic in some patients. Moreover, Lundström et al. (1984) expressed reservations about the advisability of SR in patients with late-onset transsexualism or in patients who initiated transition after the age of 30.

Individuals who feel unattractive tend to have more social anxiety and to suffer mixed adaptive emotional disorders such as anxiety and depression (Leary and Kowalski, 1995). The presence of these symptoms is not indicative of mental pathology in itself, though it may pose an important problem when the intensity and duration of the symptoms are elevated. Social anxiety or social distress is characterized by fear and avoidance of situations that involve possible scrutiny by others. Though symptoms of social anxiety are most commonly associated with social phobia and avoidant

personality disorder, they may be present in various problematic life events (Leary and Kowalski, 1995; Schlatter Navarro and Cervera Enguix, 2010).

There is little quantitative and categorical work about the experience of social distress and emotional disturbances in children, adolescents and adults with gender identity disorders. In children with gender identity disorders, Zucker and Bradley (1995) showed that they have, on average, more behavior and emotional problems than their siblings and controls. Wallien et al. (2007) found that about half of children referred for gender identity disorders met criteria of other psychiatric disorders, such as anxiety disorder (31%), disruptive disorder (23%) and mood disorder (6%). In adolescents, de Vries et al. (2011) found that 67.6% had no concurrent psychiatric disorder, anxiety disorders occurred in 21%, mood disorders in 12.4%, and disruptive disorders in 11.4%. In adult transsexuals, our team and others (Haraldsen and Dahl, 2000; Hepp et al., 2005; Gómez-Gil et al., 2009b) have reported that a history of adjustment disorders are equally very frequent in both MF and FM transsexuals while substance abuse was more common in MF transsexuals. Moreover, the prevalence of comorbid social phobia was 8.2% in MF and 11.3% in FM transsexuals (Gómez-Gil et al., 2009b).

Study into the possible effects of hormonal and surgical SR therapy on psychological parameters has mainly been focused on the effects of genital SR surgery. Several studies have demonstrated that after genital surgery, transsexuals had a better quality of life (Rakic et al., 1996; Newfield et al., 2006; Kuhn et al., 2009; Ainsworth and Spiegel, 2010), personal satisfaction (Lothstein, 1984; Cohen-Kettenis and van Goozen, 1997; Rehman et al., 1999; Lawrence, 2003), and self-confidence with their body image and self-image (Bodlund and Armelius, 1994; Wolfradt and Neumann, 2001; Kraemer et al., 2008; Weyers et al., 2009). In contrast, literature on the effect of cross-sex hormone therapy on psychological parameters is more limited. Most of the existing studies focus on changes in cognitive functions, such as specific abilities or verbal fluency, induced by the hormonal treatment (Van Goozen et al., 1995; Slabbekoorn et al., 1999; Gooren and Giltay, 2008; Gómez-Gil et al., 2009a), nevertheless the results are still controversial (Haraldsen et al., 2005; Miles et al., 2006). There is, surprisingly, little work on the effect of hormone therapy on anxiety levels and mood in transsexuals. Asscheman et al. (1989) found that combined treatment with estrogen and cyproterone acetate in MF transsexuals was associated with a 15-fold increase in depressive mood changes, however, much of the morbidity was minor. Leavitt et al. (1980) found that MF transsexuals receiving hormonal therapy showed less psychopathology on MMPI scales than untreated patients. Additionally, our team has reported that MF and FM transsexuals in the initial phases of SR may experience more distress than in later phases, but this was unlikely to have a clinically relevant impact (Gómez-Gil et al., 2008).

To our knowledge, quantitative data on social anxiety in transsexuals, and differences in anxiety and depression related to the hormonal SR treatment have not been previously reported. Therefore, the aim of the present study was to evaluate the presence of current symptoms of social distress, anxiety, and depression in transsexuals attending a gender identity unit, and compare the intensity of symptoms with regard to the cross-sex hormonal intervention. Based on previous research and our own clinical experience we hypothesized that transsexuals who have not initiated hormonal treatment would have higher levels of social distress, anxiety and depression than those under cross-sex hormonal treatment. To the best of our knowledge, this is the first investigation to examine levels of social anxiety in transsexual patients using a standard measure.

## 2. Methods

### 2.1. Sample

A sample of 200 transsexuals selected consecutively at the Gender Identity Team of the Hospital Clínic of Barcelona (Spain) was invited to participate in a cross-sectional, descriptive study. This public hospital is the only center providing specialized and comprehensive psychiatric, psychological, endocrine and surgical treatment for transsexual patients in Catalonia, Spain. Gender identity disorders were diagnosed using the *DSM-IV-TR* (American Psychiatric Association, 2000) and the *ICD-10* criteria (World Health Organization, 1993). For all cases of transsexualism included in this report, two experts agreed on the diagnosis. The unit has adopted the standards of care guidelines of the World Professional Association for Transgender Health (WPATH) (Meyer et al., 2001).

All subjects were informed that the purpose of the study was to investigate their emotional state. None of them was aware of the specific nature of our hypotheses. Written informed consent was obtained from all subjects and also from parents of adolescent patients. Participants were not paid for taking part in the study. The study was approved by the Ethical Committee of the Hospital and was conducted in accordance with the Declaration of Helsinki (World Medical Association, 1997).

The response rate was 93.5% of 200 patients who were invited to participate. The most common reasons for declining were refusal to participate or incomplete answers on the scale questionnaires. The final study population consisted of 187 transsexuals aged 15–61 years, with a mean age of 29.87 (SD = 9.15).

Transsexual patients were without or under cross-sex hormonal therapy. The transsexuals who had not yet begun hormone therapy at the time of testing, had not begun because they were still in the mental health evaluation process, receiving psychotherapy, or on the waiting list for endocrinological evaluation and treatment. Hormonal treatment for treated MF transsexuals consisted of estrogens either via the oral route (conjugated estrogens 1.8–2.4 mg/day or estradiol valerate 2–4 mg/day) or transdermal estradiol patches (3 mg twice per week, delivering 100 mg/day), generally in association with oral cyproterone

acetate (25–50 mg/day), except for patients who had undergone vaginoplasty. On average, the average length of time that the treated MF patients had been on hormone therapy was 11.0 years (S.D: 9.9; range 1–46 years). The androgen administration schedule in FM patients consisted of testosterone administered either as intramuscular injections of a testosterone esters depot (1000 mg every 10–14 weeks), or daily transdermal testosterone gel (50 mg per day), according to the patient's preference. On average, the length of time that the treated FM patients had been on hormone therapy was 4.7 years (S.D: 5.2; range 1–22 years).

### 2.2. Psychological assessment

#### 2.2.1. The Social Anxiety and Distress Scale (SADS; Watson and Friend, 1969)

The Social Anxiety and Distress Scale (SADS; Watson and Friend, 1969), one of the most widely used self-reporting measures of social anxiety, assesses avoidance and subjective distress about social interactions. True/false items assess distress and discomfort in social situations (e.g., "I am seldom at ease in a large group of people") and deliberate avoidance of social situations (e.g., "I try to avoid situations which force me to be very sociable"). Total scores range from 0 to 28, with higher scores indicating greater social anxiety. The validation of the Spanish version of the SADS has good internal consistency ( $r = .72$ ), convergent ( $r = .70$ ) and discriminant validity ( $r = .99$ ), and sufficient test–retest reliability ( $r = .86$ ) (Bobes et al., 1999). Normative values reported from the English version are 9.1 (SD = 8.0). There is a lack of published normative SADS data for the Spanish population.

#### 2.2.2. The Hospital Anxiety and Depression Scale (HADS; Herrero et al., 2003)

Symptoms of current anxiety and depression were evaluated with the Spanish validated version (Herrero et al., 2003) of the Hospital Anxiety and Depression Scale (HADS) (Zygmund and Snaith, 1983). The HADS is a 14-item self-report screening scale that was originally developed to indicate the possible presence of anxiety and depression states in the setting of a medical non-psychiatric outpatient clinic. HADS consists of two subscales, HAD-Anxiety (HAD-A) and HAD-Depression (HAD-D), each with seven items, rated on a 4-point Likert scale (e.g., as much as I always do [0]; not quite so much [1]; definitely not so much [2]; and not at all [3]), indicating either symptoms of anxiety or depression during the preceding week. A score of 0–7 on either scale is regarded as being in the normal range (no symptoms), a score of 8–10 is suggestive of the presence of a mood disorder (possible symptoms), and a score of 11 or higher indicates the probable presence of a mood disorder (symptoms) of the respective state. Maximum subscale scores are 21 for depression and anxiety, respectively. Items referring to symptoms that may have a physical cause are not included in the scale. The Spanish version of the HADS has favorable sensitivity (82%) and specificity (80%) and predictive power (81%) in identifying cases of psychiatric disorders (Herrero et al., 2003). The internal consistency, as assessed by Cronbach's alpha, was 0.90 for the full scale, 0.85 for the anxiety subscale and 0.84 for the depression subscale.

**Table 1** Sample description and comparison of socio-demographic, sexual and hormonal characteristics of transsexuals without ( $n = 67$ ) and under ( $n = 120$ ) hormonal treatment.

Characteristic	Transsexuals without hormonal treatment ( $n = 67$ )		Transsexuals under hormonal treatment ( $n = 120$ )		Statistical comparisons		
	M	SD	M	SD	$t$	$p$	
Age (years)	25.9	7.5	33.6	9.1	5.814	.001	
Age at onset of hormonal therapy			24.6	8.1			
		Transsexuals without hormonal treatment ( $n = 67$ )		Transsexuals under hormonal treatment ( $n = 120$ )	Chi-square test		
		$n$	(%)	$n$	(%)	$\chi^2$	$p$
Sex					12.83	<.001	
Male-to-female (M–F)	29	(43%)	84	(70%)			
Female-to-male (F–M)	38	(57%)	36	(30%)			
Educational level					11.04	.015	
Primary school	14	(21%)	35	(29%)			
Lower secondary school	27	(40%)	35	(29%)			
Upper secondary school	20	(30%)	21	(18%)			
Pre-university and unfinished university studies	2	(3%)	14	(12%)			
University graduate <sup>a</sup>	4	(6%)	15	(13%)			
Employment status					.01	ns	
Employment requiring high educational qualifications <sup>b</sup>	10	(15%)	13	(11%)			
Employment requiring low educational qualifications <sup>b</sup>	29	(43%)	74	(62%)			
Student <sup>b</sup>	11	(16%)	2	(2%)			
Unemployed or social support	17	(25%)	31	(26%)			
Living arrangements					6.10	ns	
Alone	10	(15%)	24	(20%)			
With partner	13	(19%)	38	(32%)			
With parents	37	(55%)	45	(38%)			
With friends	7	(10%)	13	(11%)			
Sexual orientation					6.70	ns	
Same biological sex	56	(84%)	111	(93%)			
Opposite biological sex <sup>c</sup>	4	(6%)	5	(4%)			
Bisexual <sup>c</sup>	4	(6%)	4	(3%)			
Unknown <sup>c</sup>	3	(4%)	0	(0%)			
Sex reassignment surgery							
Male-to-female ( $n = 113$ )		$n = 29$		$n = 84$			
At least one surgery	1	(4%)	49	(58%)	24.15	.000	
Mammoplasty	1	(4%)	43	(51%)			
Facial feminization surgery	1	(4%)	9	(11%)			
Buttocks feminization surgery			9	(11%)			
Vaginoplasty			4	(5%)			
Orchiectomy			2	(2%)			
Thyroid chondroplasty			2	(2%)			
Female-to-male ( $n = 74$ )		$n = 38$		$n = 36$	40.71	.000	
At least one surgery	1	(3%)	28	(78%)		.000	
Breast reduction/mastectomy	1	(3%)	28	(78%)			
Hysterectomy			19	(53%)			
Phalloplasty			2	(6%)			

Note. <sup>a,b,c</sup>Categories were collapsed for statistical analysis.

### 2.3. Procedure

Transsexuals participants were divided into two subgroups: those who had received cross-sex hormonal therapy ( $n = 120$ ) and those who had not ( $n = 67$ ). Demographic and clinical data were extracted from medical records (Table 1). The SADS and HADS questionnaires were completed by the patients independently.

### 2.4. Statistics

All analyses were conducted using PASW Statistics 18.0. Between-group differences for selected continuous variables were examined with ANCOVA, controlled for the variables that could differ between both groups to assure their comparability (age, gender, and educational level). Categorical variables were analyzed using the Chi-square test. Pearson's correlation coefficient was calculated to verify linear association between SADS, HAD-A, HAD-D, and length of time patients have been on hormone therapy. We reported effect size by partial eta-squared ( $\eta^2$ ) and Cramer's  $V$  to evaluate the clinical significance of the statistically significant findings. In behavioral science research, a partial eta-square ( $\eta^2$ ) of 0.01 is considered a small effect size; 0.06 is a medium effect size and 0.14 is a large effect size (Cohen, 1988). A Cramer's  $V$  of 0.1 is considered a small effect size; 0.30 is a medium effect size and 0.50 is a large effect size (Cohen, 1988). All tests were two-tailed. Significance level was set at 5% ( $p \leq 0.05$ ).

## 3. Results

### 3.1. Sample description

The transsexual group without hormonal treatment was significantly younger (more than 7 years), had a lower percentage of MF transsexuals (43.3% vs. 70%), and a lower educational level than the group under treatment (Table 1). Both groups were equivalent in living arrangements and sexual orientation. We found sexual orientation to be mainly towards a same-biological sex partner (information about sexual orientation related to biological sex in this population has been provided in Gómez-Gil et al., 2009b). The percentages of patient activity (employed and student) were similar. In the subgroup of patients under hormonal treatment, 58% of the MF transsexuals and 78% of the FM

transsexuals had undergone at least one SR surgery procedure. To assure the comparability of these two groups, possible confounding factors were controlled in statistical analysis.

### 3.2. Social distress, anxiety and depression scores in transsexuals without and under cross-sex hormonal treatment

The mean SADS, HAD-A and HAD-D scores were on the normal range except for HAD-A subscale in the non-treated transsexual group (mean = 9; SD = 4.0) (Table 2). ANOVA tested the relation between SADS, HAD-A and HAD-D and the hormonal treatment. Transsexual patients who have not received hormone therapy at any time reported higher levels of SADS, HAD-A and HAD-D than those with current cross-sex hormonal treatment, with statistically significant differences (Table 2). When age, gender and education were added to the analysis, only an interaction between HAD-D and educational level could be confirmed. HAD-D scores were higher for patients with lower educational level ( $p = .005$ , partial eta squared = .043).

### 3.3. Percentages of transsexuals with symptoms of anxiety and depression according to the hormonal treatment

Overall, 61% of the group of patients without treatment and 33% of the group with hormonal treatment experienced possible symptoms (score 8–10) or symptoms (score >11) of anxiety (Table 3). The same pattern was found for symptoms of depression; the percentages were significantly higher in the group of patients without treatment (31%) than in the group on hormonal treatment (8%).

### 3.4. Social distress, anxiety and depression scores in the subgroup of transsexuals under hormonal treatment, compared according to the performance of some SR surgery

In the subgroup of transsexuals under hormonal treatment, the mean SADS, HAD-A, and HAD-D scores were in the normal range, and did not differ when transsexuals who have not received any SR surgery and those who had received at least one SR surgery were compared (Table 4).

**Table 2** Means, standard deviations, and statistical comparisons with ANOVA with adjustment for age, gender, and educational level, of the relationship between SADS, HAD-Anxiety and HAD-Depression subscales and cross-sex hormonal treatment in transsexual patients.

	Transsexuals without hormonal treatment ( $n = 67$ ) M (SD)	Transsexuals under hormonal treatment ( $n = 120$ ) M (SD)	ANOVA		Effect size $\eta^2$
			$F$	$p$	
SADS	11 (7.3)	8.5 (7.8)	4.36	.038	.024
HAD-A	9 (4.0)	6.4 (3.7)	14.59	.001	.075
HAD-D	5.2 (4.2)	3.3 (3.2)	9.52	.002	.050

*Abbreviations:* SADS, Social Avoidance and Distress Scale; HAD-A: Hospital Anxiety and Depression, Anxiety Scale; HAD-D: Hospital Anxiety and Depression, Depression Scale.

**Table 3** Prevalence of no symptoms, possible symptoms and symptoms of anxiety and depression measured with HAD-Anxiety and HAD-Depression subscales in transsexual patients without and under cross-sex hormonal treatment, and statistical comparisons.

	Transsexuals without hormonal treatment ( <i>n</i> = 67) <i>n</i> (%)	Transsexuals under hormonal treatment ( <i>n</i> = 120) <i>n</i> (%)	Chi-square comparisons		Effect size <i>V</i>
			$\chi^2$	<i>p</i>	
HAD-Anxiety: prevalence (%)			14.46 <sup>a</sup>	.001	.278
Score 0–7 (no symptoms) <sup>a</sup>	26 (39%)	81 (67%)			
Score 8–21 (symptoms) <sup>a</sup>	41 (61%)	39 (33%)			
Score 8–10 (possible symptoms)	20 (30%)	20 (17%)			
Score 11–21 (symptoms)	21 (31%)	19 (16%)			
HAD-Depression: prevalence (%)			16.46 <sup>a</sup>	.001	.297
Score 0–7 (no symptoms) <sup>a</sup>	46 (69%)	110 (92%)			
Score 8–21 (symptoms) <sup>a</sup>	21 (31%)	10 (8%)			
Score 8–10 (possible symptoms)	15 (22%)	6 (5%)			
Score 11–21 (symptoms)	6 (9%)	4 (3%)			

Abbreviations: HAD-A: Hospital Anxiety and Depression, Anxiety Scale; HAD-D: Hospital Anxiety and Depression, Depression Scale.

<sup>a</sup> Chi-square test only comparing score 0–7 (no symptoms) and score 8–21 (symptoms) was performed.

**Table 4** Means, standard deviations and statistical comparisons of the relationship between SADS, HAD-Anxiety and HAD-Depression subscales and SR surgery procedures performed in the subgroup of transsexuals under cross-sex hormonal treatment.

	Transsexuals under hormonal treatment without any SR surgery performed ( <i>n</i> = 43) M (SD)	Transsexuals under hormonal treatment with at least one SR surgery performed ( <i>n</i> = 77) M (SD)	ANOVA		Effect size $\eta^2$
			<i>F</i>	<i>p</i>	
SADS	9.2 (7.9)	8.1 (7.7)	.58	.446	.005
HAD-A	6.4 (3.9)	6.4 (3.5)	.01	1.000	.001
HAD-D	3.5 (3.3)	3.2 (3.1)	.27	.602	.002

Abbreviations: SADS, Social Avoidance and Distress Scale; HAD-A: Hospital Anxiety and Depression, Anxiety Scale; HAD-D: Hospital Anxiety and Depression, Depression Scale.

### 3.5. Relationship between symptoms of social distress, anxiety, depression, and length of time on hormonal treatment

HAD-A was positively correlated with HAD-D scores ( $r(120) = .62$ ,  $p = .001$ ). The SADS score was not correlated with the HAD-A and HAD-D scores. Among all participants with hormonal treatment, the length of time on hormonal treatment did not correlate with the SADS, HAD-A and HAD-D scores.

## 4. Discussion

The study aimed at describing the presence of current social distress, anxiety, and depression in transsexual patients attending a gender identity unit. Results from this study indicated that these patients do not appear to notably differ from the normative sample in terms of mean levels of social distress, anxiety, and depression. Moreover, patients who have not yet initiated cross-sex hormonal treatment showed significantly higher mean levels of these emotional disturbances than patients under cross sex-hormonal treatment. Finally, the percentage of transsexual patients who exhibited clinically elevated anxiety or depressive symptoms was much higher in untreated patients than in treated patients.

An interesting result of our study is that on average, the mean SADS score in untreated transsexuals (mean = 11; SD = 7.3) is only slightly higher than the mean of 9.1 (SD = 8.0) for the normative sample reported by the scale authors (Watson and Friend, 1969). Therefore, this study suggests that, in general, transsexual patients, contrary to our hypothesis, do not appear to suffer notably in terms of social distress. Since the SADS gives a quantitative measure of social anxiety but is not suitable as a diagnostic tool for social phobia disorder (Clark et al., 1997), data are not comparable with the reported prevalence of comorbid social phobia in transsexuals (Gómez-Gil et al., 2009b). The mean SADS score in our study in both groups of transsexuals notably differs from other clinical samples characterized by high levels of social anxiety (mean values >18) such as agoraphobia, generalized anxiety disorders, obsessive–compulsive disorder, social phobia (Turner et al., 1987), and body dysmorphic disorders (Pinto and Phillips, 2005). This result may be in accordance with the study of Bodlund and Armelius (1994). They found that transsexuals had a normal self-image compared with controls. Moreover, our finding is also consistent with Wolfradt and Neumann's (2001) research. They found that the self-esteem and body image scores in postoperative MF transsexuals and control males were significantly higher than in control females. They explain this finding as due to

the surgical SR treatment these patients had received, and that the patients, therefore, present an overall satisfaction with hormonal and/or surgical reassignment results.

Similarly, on average, both groups started out in the normal range of the measured anxiety and depressive scale. In an evaluation study of the psychometric characteristics of the Spanish version of the HADS, results of the control sample with similar mean age was 6.77 (SD = 3.35) for HAD-A and 2.44 (SD = 2.33) for HAD-D (Quintana et al., 2003). These data are only slightly lower than in our sample. These results are in accordance with recent investigations. Weyers et al. (2009) found that MF transsexuals who had undergone SR surgery function well on a physical, emotional, psychological, and social level, compared with reference population. Moreover, results from our group found that the majority of transsexual patients attending the gender unit were free of psychopathology according to the MMPI (Gómez-Gil et al., 2008).

Some key variables associated with emotional state may help to explain these findings. Social and familial support and quality of life could be variables that served as a buffer against emotional distress. Further studies are needed to determine whether these variables may help to explain our results. Moreover, one has to bear in mind that in general the transsexual patients attending a gender team are happy in the knowledge that the hormonal therapy and operations will be performed within a reasonable time (Kuiper and Cohen-Kettenis, 1988). In fact, we suspect findings would likely be different if therapy were discontinued, or in patients who have no possibility of being attended by a gender team, or in transsexuals without familial or social support.

The second and most interesting result from this study is that, in agreement with our hypothesis and previous studies (Leavitt et al., 1980; Gómez-Gil et al., 2008), patients who have not yet initiated cross-sex hormonal treatment showed significantly higher levels of social distress and emotional disturbances than patients under this treatment. Since both groups started out on average in the normal range of the measured psychopathology, and the effect size was low for SADS and HAD-D, and medium for HAD-A differences, the clinical significance of this result may be questionable. Nevertheless, low mean scores on these scales are interpreted as unspecific signs of distress and negative emotional manifestations (Dunbar et al., 2000). Therefore, our data suggest that untreated patients suffer from a higher degree of anticipatory anxiety, social avoidance, and emotional disturbance than patients who are receiving hormonal treatment, even though most of their symptoms probably do not present enough intensity to meet the categorical diagnostic criteria for a DSM or ICD anxiety or mood mental disorder.

When assessing the prevalence of symptoms, for the subgroup without hormonal treatment, approximately two-thirds of the patients suffered some anxiety symptoms and one-third suffered some depressive symptoms. Although HADS was not designed to establish a diagnosis of these disorders (Zygmund and Snaith, 1983), these percentages are high, and help identify risk groups with problems of some kind.

Altogether, according to our results, there appears to be an association between hormonal SR treatment in transsexuals and lower level of social distress and emotional disturbances. This association might have several explanations. First, the emotional differences might be a direct

effect of hormone therapy. As previously reported, estrogens and androgens may plausibly exert different effects on mood. Estrogens may make individuals more prone to anxiety and depression (Asscheman et al., 1989). In contrast, androgens would promote feelings of euphoria and energy (Su et al., 1993). On the other hand, affective problems are more prevalent in women than in men (Parker and Brotchie, 2010). Hence, one would expect that treated MF transsexuals might display a higher prevalence of depressive and anxiety symptoms than treated FM patients, and conversely for untreated MF and FM transsexuals. Nevertheless, our study did not find differences between MF and FM when gender was included in the statistical analyses. Therefore, our results did not support this hypothesis, and, in accordance with Kuiper and Cohen-Kettenis (1988), there appears to be no direct relation between the hormonal therapy itself and the patient's subjective well-being. Second, emotional disturbances in transsexuals might be considered as a realistic reaction to their incongruent body image and to the social stigma they have to face. The cross-sex hormonal treatment induces beneficial changes in the body features and shape (Kraemer et al., 2008), and these changes may be bigger in patients with more time on hormone therapy. In fact, Leavitt et al. (1980) found that length of hormonal treatment was related to emotional adjustment. Therefore, one would expect that the effect of hormonal treatment on the social distress and emotional state may be a result of the changes it induces in body shape. Nevertheless, in our study, the length of time on the hormonal treatment was not associated with the patients' level of social distress, anxiety or depression. Moreover, transsexual patients on hormonal treatment who had received at least one SR surgery did not differ from transsexual patients who had not received any SR surgery. Overall, our results suggest that a satisfactory outcome does not solely depend on good cosmetic and functional operative results. Future researchers should consider investigating whether ratings of self-perceived attractiveness mediate the relationship between anxiety/depression, and hormonal treatment. Third, another explanation may be that the initiation of the SR process *per se* is the key factor in reducing emotional disturbances. Perhaps the untreated transsexuals are different and have a greater psychological problem because hormone therapy has not been initiated. However, since this is a cross-sectional design, there is no way to determine the last hypothesis, or to conclude definitively that initiating SR treatment improves mental health. Further longitudinal studies are needed to resolve this issue.

Some limitations of the current study are noteworthy. First, the study was cross-sectional. Longitudinal studies are needed as the cross-sectional nature of these data complicates conclusions about causality of the effects of hormonal treatment on emotional status. Moreover, the generalization of our findings may be limited by the fact that subjects were recruited from a specialized gender identity unit in Spain. So the results may not extend to transsexuals from our region who do not have information about the unit and the possibilities of SR treatment, or transsexuals from other regions, communities or countries that do not offer public health treatment to these patients. Due to evaluation and treatment processes involving social interaction, transsexuals who do not seek treatment may be even more socially avoidant than the current sample.

A major strength of this study is that it is the first to investigate emotional disturbances and their relation with cross-sex hormonal treatment. Moreover, it has been conducted at the main gender identity unit in a region where the vast majority of transsexual patients receive care. This, combined with the high response rate, makes it possible to generalize the findings from transsexual patients attending the gender identity unit of Catalonia.

In summary, the study provides valuable information on the social distress, anxiety and depression symptoms of transsexual patients. Data reflect that transsexuals attending a gender identity unit reported subclinical levels of symptoms of anxiety and depression. Moreover, patients who had not initiated cross-sex hormonal treatment reported higher levels of social distress, anxiety and depression than patients under cross-sex hormonal treatment. Although the findings do not conclusively demonstrate direct positive effects of hormone treatment, there appears to be a relationship between cross-sex hormonal SR therapy and a lower level of social distress and emotional disturbances in transsexuals.

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### Conflicts of interest statement

Co-authors do not have financial or personal conflicts of interest in this area.

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