ORIGINAL RESEARCH—INTERSEX AND GENDER IDENTITY DISORDERS

Is Hormonal Therapy Associated with Better Quality of Life in Transsexuals? A Cross-Sectional Study

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ABSTRACT

Introduction. Although the impact of sex reassignment surgery on the self-reported outcomes of transsexuals has been largely described, the data available regarding the impact of hormone therapy on the daily lives of these individuals are scarce.

Aims. The objectives of this study were to assess the relationship between hormonal therapy and the self-reported quality of life (QoL) in transsexuals while taking into account the key confounding factors and to compare the QoL levels between transsexuals who have, vs. those who have not, undergone cross-sex hormone therapy as well as between transsexuals and the general population (French age- and sex-matched controls).

Methods. This study incorporated a cross-sectional design that was conducted in three psychiatric departments of public university teaching hospitals in France. The inclusion criteria were as follows: 18 years or older, diagnosis of gender identity disorder (302.85) according to the Diagnostic and Statistical Manual, fourth edition text revision (DSM-IV TR), inclusion in a standardized sex reassignment procedure following the agreement of a multidisciplinary team, and pre-sex reassignment surgery.

Main Outcome Measure. QoL was assessed using the Short Form 36 (SF-36).

Results. The mean age of the total sample was 34.7 years, and the sex ratio was 1:1. Forty-four (72.1%) of the participants received hormonal therapy. Hormonal therapy and depression were independent predictive factors of the SF-36 mental composite score. Hormonal therapy was significantly associated with a higher QoL, while depression was significantly associated with a lower QoL. Transsexuals' QoL, independently of hormonal status, did not differ from the French age- and sex-matched controls except for two subscales of the SF-36 questionnaire: role physical (lower scores in transsexuals) and general health (lower scores in controls).

Conclusion. The present study suggests a positive effect of hormone therapy on transsexuals' QoL after accounting for confounding factors. These results will be useful for healthcare providers of transgender persons but should be confirmed with larger samples using a prospective study design. **Gorin-Lazard A, Baumstarck K, Boyer L, Maquigneau A, Gebleux S, Penochet J-C, Pringuey D, Albarel F, Morange I, Loundou A, Berbis J, Auquier P, Lançon C, and Bonierbale M. Is hormonal therapy associated with better quality of life in transsexuals? A cross-sectional study. J Sex Med 2012;9:531–541.**

Key Words. Transsexualism; Gender Identity Disorder; Gender Dysphoria; Sex Reassignment; Hormonal Therapy; Quality of Life

Introduction

When clinicians attempt to assess treatment protocols for the care of patients with gender identity disorder [1], two difficulties become apparent: (i) the absence of criteria for defining the subjects as eligible for a specific treatment and (ii) the lack of consensus on the therapeutic approach, which could differ by country. However, most of the countries involved in transsexual care have accepted the standards of care developed by the World Professional Association for Transgender Health (WPATH) [2], which are based on a somatic and psychiatric assessment before the initiation of a hormono-surgical treatment. Cross-sex hormonal therapy interests transsexuals as a means of matching their gender identification and physical appearance. The goals of hormonal treatment are to induce the development of the secondary sex characteristics of the new sex and to diminish those of the natal sex [3].

In France, the French Society for Transsexual Management (Société Française d'Etudes et de Prise en Charge du Transsexualisme) has recently been constituted to improve coordination and organization among the various professionals involved in transsexual care with respect to the French law and deontology (June, 2011; http://www.transsexualisme.info). The society has elaborated a chart based on the principals of WPATH and the French Health Authority [4], which includes the following requirement: a 12-month minimum period of multidisciplinary evaluation to obtain a ruling on eligibility for a sex reassignment procedure. The psychological/psychiatric evaluation consists of verifying the following main criteria: (i) to accurately diagnose the gender identity disorder (Diagnostic and Statistical Manual criteria fulfilled); (ii) to verify the persistence of the request; and (iii) to exclude schizophrenia and other psychotic disorders and diagnose/treat any other comorbid psychiatric conditions. Hormonal therapy is initialized during a 12-month minimum period before sex reassignment surgery [2]. The hormonal therapy proceeds with a reversible phase followed by an irreversible phase, consisting mainly of the following: for the male-to-female (MtF) patients, "devirilization" using cyproterone acetate followed by "feminization" using estrogens combined with antiandrogens; for the female-to-male (FtM) patients, "defeminization" using synthetic progestagens followed by "virilization" using testosterone. Mastectomy for FtM individuals was considered as sex reassignment surgery in accordance with the French Health Authority report [4].

Although the impact of sex reassignment surgery on satisfaction or quality of life (QoL) has been previously described [2,5–20], very few data are available concerning the impact of hormonal therapy on the daily life of subjects. A recent meta-analysis [21] of the impact of hormonal therapy and sex reassignment on QoL and psychosocial outcomes identified only five studies that specifically examined hormonal therapy. Research assessments have examined the impact of hormonal therapy on the outcomes of transformation satisfaction [22], psychological profile [23], cognitive function [24,25], and emotional repercussions [25]. Only one study documenting the potential impact of hormonal therapy on transgender QoL assessed this factor using the well-validated SF-36 version 2.0 questionnaire [26]. This study found that subjects receiving hormones presented higher QoL levels. This study enrolled a large sample (N = 446) comprised solely of FtM individuals. The data were collected using the Internet; the sample was a community sample without diagnosis relying on a mental health (MH) professional, and the participants were not screened for MH problems with psychological indices. To our knowledge, no study has assessed the impact of hormonal therapy on QoL in transsexual patients who have been diagnosed by a multidisciplinary team of specialists and who have not undergone sex reassignment surgery. We hypothesized that being treated with hormonal therapy during the preoperative period would improve many aspects of the individual's life, notably the QoL, as soon as the sixth month after the beginning of the treatment. The aims of this study are to (i) assess the relationship between hormonal therapy and the self-reported QoL in transsexuals while taking into account the key confounding factors and (ii) compare the QoL levels of the transsexual population with the general population (French age- and sex-matched controls).

Methods

Study Design and Sample

This study incorporated a cross-sectional design and was conducted in three psychiatric departments of public university teaching hospitals in the south of France (Marseille, Montpellier, and Nice).

The inclusion criteria were as follows: 18 years or older, diagnosis of gender identity disorder (302.85) according to the Diagnostic and Statistical Manual, fourth edition text revision (DSM-IV TR) criteria [1], inclusion in a standardized sex reassignment procedure [3] following the agreement of a multidisciplinary team [4], the absence of schizophrenia and other psychotic disorders (395.x) according to DSM-IV TR criteria, the absence of an unstable psychiatric comorbidity (except nonmajor depressive disorder) as assessed by the Mini-International Neuropsychiatric Interview, and a native French speaker. The confirmation of the diagnosis was based on a standardized assessment as recommended by the French Health Authority [4]. In the three participating centers, this assessment was performed by both psychiatrists and psychologists specializing gender identity disorder management, using a combination of unstructured and structured interviews containing psychometric scales. A total of 8–12 interviews were performed during a 12-month period. The study was proposed to each consecutive eligible subject by the care team during a routine visit. Participation was voluntary, and the responses to the self-reported questionnaires were anonymous and confidential. All participants provided written informed consent. The study was supported by the French Ministry of Health (Programme Hospitalier de Recherche Clinique) and was approved by the local ethics committee (Comité de Protection des Personnes, Marseille, France).

Of the 67 consecutive individuals approached for participation in this study, 61 participants agreed to participate in the study. Six individuals declined to participate, declaring that they did not wish to be assessed. The 61 participants did not differ from the six individuals who refused to provide self-reported questionnaires in terms of age, gender identity, educational level, and partnership status (data not shown). The mean age of the total sample was 34.7 years, and the sex ratio was 1:1.

Data Collection

The following data were collected.

1. Sociodemographic information: age, gender identity (MtF/FtM), education level (<12 years/ ≥12 years), partnership status (not single/ single), living arrangement (partner or parents/ alone), employment status (no/yes), having children at home (no/yes), and sexual orientation (same biological sex or not).
2. Hormonal therapy: A patient was categorized into the hormonal therapy group if he/she received cross-sex hormones prescribed by a physician as a part of the sex reassignment procedure. A patient was categorized into the nonhormonal therapy group if he/she was included in the sex reassignment procedure before the initiation of hormonal therapy.
3. Depression was assessed using the self-administered Beck Depression Inventory (BDI) short version, which contains 13 items [27,28]. The items assessed included the following: mood/sadness, pessimism, sense of failure, self-dissatisfaction, guilt, self-dislike, suicidal ideas, social withdrawal, indecision, bodily preoccupation, work difficulties, fatigue, and appetite. The score range is 0–39, with higher scores indicating greater depression (score <4: no depression) [27]. This version is largely used by French professionals, particularly in the psychopharmacology domain.
4. QoL was assessed using the Short Form 36 (SF-36), which is a generic questionnaire [29,30] that has eight subscales (physical function [PF, related to the physical limitations], social functioning [SF, related to the impact of health on social activities], role physical [RP, related to limitations in work/activities because of physical health problems], role emotional [RE, related to limitations in work/activities because of MH problems], overall MH, vitality [V, related to energy/fatigue], bodily pain [related to the intensity/impact of pain], and general health [GH, related to individual's perception of well-being]), with scores ranging from 0 (low) to 100 (high QoL level). Two component summary measures of the SF-36, namely the physical composite score and mental composite score (PCS and MCS, respectively) can be calculated. Higher scores indicate higher QoL levels.

Statistical Analysis

Continuous variables were expressed as means and standard deviations or medians and ranges depending on whether the variable had a parametric or nonparametric distribution. Qualitative variables were expressed as percentages. Nonparametric statistics were employed. Comparisons of mean QoL scores between different subgroups (hormonal therapy, gender identity, educational level, partnership status, living arrangement, employment status, children at home, sexual orientation, and depression) were performed using Mann–Whitney tests. Associations between QoL

Table 1 Characteristics of the sample at inclusion

		Total N = 61	% [95% CI]	MtF N = 31	FtM N = 30	*P*
Age years, M ± SD*		34.7 ± 10.3		39.4 ± 9.8	29.9 ± 8.4	<0.001
Educational level	<12 years	28	46.7 [34.2–59.2]	15 (48.4)	13 (44.8)	0.802
	≥12 years	32	53.3 [40.8–65.87]	16 (51.6)	16 (55.2)	
Partnership status	Not single	8	13.3 [4.8–21.8]	8 (25.8)	—	0.005
	Single	52	86.7 [78.2–95.2]	23 (74.2)	29 (100.0)	
Living arrangements	With partner/parents	37	61.7 [49.5–73.9]	16 (51.6)	21 (72.4)	0.118
	Alone	23	38.3 [26.1–50.5]	15 (48.4)	8 (27.6)	
Employment status	No	26	43.3 [30.9–55.7]	14 (45.2)	12 (41.4)	0.800
	Yes	34	56.7 [44.3–69.1]	17 (54.8)	17 (58.6)	
Children at home	No	50	83.3 [73.9–92.7]	24 (77.4)	26 (89.7)	0.302
	Yes	10	16.7 [7.3–26.1]	7 (22.6)	3 (10.3)	
Sexual orientation	Same biological sex	46	75.4 [64.6–86.2]	17 (54.8)	29 (96.7)	<0.001
	Others	15	24.6 [13.8–35.4]	14 (45.2)	1 (3.3)	
Hormonal therapy	No	17	27.9 [16.6–39.2]	6 (19.4)	11 (36.7)	0.161
	Yes	44	72.1 [60.8–83.4]	25 (80.6)	19 (63.3)	
Depression	No	46	75.4 [64.6–86.2]	24 (77.4)	22 (73.3)	0.772
	Yes	15	24.6 [13.8–35.4]	7 (22.6)	8 (26.7)	
SF-36, M ± SD*	Physical function	91.1 ± 12.7		92.7 ± 9.0	89.4 ± 15.7	0.803
	Social functioning	79.5 ± 24.2		82.7 ± 20.6	76.3 ± 27.3	0.455
	Role physical	80.7 ± 30.4		84.7 ± 25.6	76.7 ± 34.7	0.506
	Role emotional	79.2 ± 32.3		77.4 ± 33.7	81.1 ± 31.2	0.655
	Mental health	71.5 ± 17.5		73.0 ± 17.7	70.0 ± 17.3	0.455
	Vitality	63.0 ± 17.7		63.4 ± 19.0	62.7 ± 16.5	0.890
	Body pain	75.0 ± 18.9		74.0 ± 18.1	75.9 ± 20.1	0.520
	General health	78.3 ± 16.0		77.1 ± 17.5	79.6 ± 14.5	0.566
	Physical composite score	52.5 ± 6.4		52.8 ± 4.3	52.3 ± 8.1	0.806
	Mental composite score	47.9 ± 10.5		48.2 ± 10.9	47.6 ± 10.4	0.773

*M ± SD, mean ± standard deviation
CI = confidence interval; MtF = male-to-female; FtM = female-to-male; SF-36 = Short Form 36

scores and continuous variables (age) were analyzed using Spearman's correlation tests.

To determine which variables predicted MCS/PCS QoL levels, multiple linear regressions (forward-stepwise selection) were performed. The MCS and PCS were considered separate dependent variables. Variables relevant to the models were selected based on their clinical interest (hormonal therapy, age, gender identity, educational level, partnership status, children at home, sexual orientation, and depression) and/or a threshold *P* value < 0.30 in the univariate analysis. The final models incorporated the standardized beta coefficients, which represent a change in the standard deviation of the dependent variable (PCS and MCS) resulting from a change of one standard deviation in the various independent variables. The independent variables with a higher standardized beta coefficient exert a greater relative effect on QoL.

Finally, using paired Student's *t*-tests, the SF-36 scores of transsexuals were compared with those obtained from French age- and sex-matched controls from a normative sample of 3,656 subjects with no adverse health conditions [30].

Statistical significance was defined as $P < 0.05$. Statistical analysis was performed using the SPSS version 15.0 software package (SPSS Inc., Chicago, IL, USA).

Results

The sociodemographic, depression, and QoL scores of the 61 participants are detailed in Table 1. The patients had no psychiatric comorbidities, except for depression in 25% of them (six patients with mild depression and eight patients with moderate depression, none with severe depression). Forty-four patients (72.1%) received hormonal therapy.

These patients were all in regular hormonal treatment therapy for a minimum period of 12 months (median 20 months; range 12–42 months). All 25 MtF patients received antiandrogens along with estrogens, and the 19 FtM patients received synthetic progestagens with testosterone. The results of the univariate analysis are presented in Table 2. Hormonal therapy was significantly associated with higher scores on the social, emotional, and mental QoL dimensions (SF, RE, MH, and

Table 2 Associations between SF-36 dimension/composite scores and sociodemographic and clinical characteristics

	Physical function	Social functioning	Role physical	Role emotional	Mental health	Vitality	Body pain	General health	PCS	MCS
Age†	0.197	0.365	0.231	0.334	0.214	0.159	0.082	–0.031	–0.023	0.303
P	0.128	0.004	0.073	0.009	0.097	0.220	0.527	0.814	0.858	0.018
Gender identity*										
MtF	92.7 ± 9.0	82.7 ± 20.6	84.7 ± 25.6	77.4 ± 33.8	73.0 ± 17.7	63.4 ± 19.0	74.0 ± 18.1	77.1 ± 17.5	52.8 ± 4.3	48.2 ± 10.9
FtM	89.4 ± 15.7	76.3 ± 27.3	76.7 ± 34.7	81.1 ± 31.2	70.0 ± 17.3	62.7 ± 16.5	75.9 ± 20.1	79.6 ± 14.5	52.3 ± 8.1	47.6 ± 10.4
P	0.803	0.455	0.506	0.655	0.455	0.890	0.520	0.566	0.806	0.773
Educational level*										
<12 years	91.8 ± 1.6	84.4 ± 4.0	78.6 ± 5.6	78.6 ± 6.0	73.0 ± 3.5	65.0 ± 3.3	76.3 ± 3.2	77.5 ± 2.8	52.3 ± 0.9	49.0 ± 2.0
≥12 years	90.4 ± 2.8	75.4 ± 4.6	82.8 ± 5.7	80.2 ± 6.0	70.1 ± 3.0	61.3 ± 3.3	74.2 ± 3.7	79.5 ± 3.1	52.9 ± 1.4	47.0 ± 1.9
P	0.413	0.162	0.271	0.643	0.409	0.531	0.975	0.469	0.208	0.314
Partnership status*										
Not single	92.5 ± 12.0	98.4 ± 4.4	96.9 ± 8.8	95.8 ± 11.8	78.0 ± 12.3	73.1 ± 14.1	76.6 ± 14.6	77.4 ± 20.2	52.3 ± 5.0	54.4 ± 4.5
Single	90.8 ± 13.1	76.7 ± 24.9	78.4 ± 32.1	76.9 ± 34.0	70.5 ± 18.2	61.4 ± 18.0	74.9 ± 19.7	78.8 ± 15.5	52.6 ± 6.7	46.9 ± 11.0
P	0.697	0.006	0.103	0.127	0.526	0.084	0.918	0.974	0.632	0.086
Living arrangement*										
With partner/parents	92.5 ± 9.9	80.7 ± 23.3	81.8 ± 29.8	84.7 ± 26.8	70.6 ± 17.7	63.1 ± 17.7	77.5 ± 18.2	80.2 ± 16.0	53.2 ± 6.8	48.2 ± 10.7
Alone	88.7 ± 16.5	77.7 ± 26.4	79.3 ± 32.6	71.0 ± 39.3	72.9 ± 17.7	62.8 ± 18.5	71.5 ± 20.1	75.9 ± 16.1	51.6 ± 5.9	47.4 ± 10.7
P	0.737	0.702	0.771	0.188	0.506	0.630	0.184	0.204	0.199	0.958
Employment status*										
No	87.8 ± 2.9	79.8 ± 4.0	73.1 ± 6.6	75.6 ± 7.3	69.4 ± 2.8	57.9 ± 3.1	73.3 ± 3.7	75.2 ± 2.5	50.9 ± 1.2	47.0 ± 1.9
Yes	93.5 ± 1.8	79.4 ± 4.7	86.8 ± 4.6	82.4 ± 4.9	73.1 ± 2.4	66.9 ± 3.2	76.6 ± 3.3	81.2 ± 3.1	53.9 ± 1.1	48.6 ± 1.9
P	0.044	0.617	0.059	0.550	0.134	0.027	0.379	0.057	0.029	0.205
Children at home*										
No	91.0 ± 13.1	76.8 ± 31.8	79.5 ± 31.8	75.3 ± 34.2	70.9 ± 18.5	61.0 ± 18.1	74.9 ± 19.9	78.8 ± 15.5	52.8 ± 6.5	46.7 ± 11.1
Yes	91.5 ± 12.3	93.5 ± 24.3	87.5 ± 24.3	100.00 ± 00	74.4 ± 12.8	73.0 ± 13.0	76.4 ± 14.6	77.6 ± 19.4	51.5 ± 6.5	53.9 ± 4.4
P	0.851	0.033	0.526	0.014	0.921	0.051	0.917	0.968	0.428	0.078
Sexual orientation*										
Same biological sex	90.0 ± 13.5	75.3 ± 25.3	75.5 ± 33.1	73.9 ± 35.1	69.1 ± 17.2	59.9 ± 17.9	72.9 ± 20.3	78.1 ± 15.5	52.2 ± 7.0	46.1 ± 10.8
Others	94.7 ± 9.5	92.5 ± 14.0	96.7 ± 8.8	95.6 ± 11.7	78.9 ± 16.7	72.7 ± 13.6	81.3 ± 12.4	79.1 ± 18.1	53.6 ± 4.3	53.7 ± 7.5
P	0.137	0.009	0.016	0.024	0.072	0.020	0.206	0.800	0.651	0.014
Depression*										
No	93.0 ± 9.7	87.0 ± 20.0	85.9 ± 25.6	89.9 ± 26.2	77.7 ± 12.3	69.1 ± 13.1	78.1 ± 16.8	82.8 ± 14.3	52.8 ± 5.1	52.0 ± 6.9
Yes	85.3 ± 18.6	56.7 ± 22.1	65.0 ± 38.7	46.7 ± 27.6	52.5 ± 17.6	44.3 ± 17.1	65.7 ± 22.6	64.5 ± 13.3	51.6 ± 9.7	35.3 ± 9.8
P	0.039	<0.001	0.026	<0.001	<0.001	<0.001	0.052	<0.001	0.815	<0.001
Hormonal therapy*										
No	89.1 ± 16.7	69.9 ± 24.2	76.5 ± 33.6	54.9 ± 40.7	59.1 ± 19.6	55.0 ± 22.6	70.8 ± 20.9	75.6 ± 15.9	54.0 ± 6.4	39.8 ± 12.7
Yes	91.9 ± 11.0	83.2 ± 23.3	82.4 ± 29.3	88.6 ± 22.7	76.4 ± 14.1	66.1 ± 14.5	76.6 ± 18.1	79.4 ± 16.1	52.0 ± 6.4	51.0 ± 7.7
P	0.729	0.026	0.409	0.001	0.004	0.137	0.452	0.364	0.260	0.003

*Mean ± standard deviation, *P*: *P* value Mann–Whitney test
†Spearman's correlation coefficient, *P*: *P* value Spearman's test
PCS = physical composite score; MCS = mental composite score; MtF = male-to-female; FtM = female-to-male; SF-36 = Short Form 36

MCS). Although MtFs did not differ from the FtM study subjects, individuals with a sexual orientation toward the same biological sex reported significantly lower QoL according to SF, RP, RE, V, and MCS scores than those with another sexual orientation. When the 31 MtFs were evaluated separately, individuals with a sexual orientation toward the same biological sex again reported significantly lower QoL on SF, RP, RE, V, and MCS measures than individuals with other sexual orientations (data are available from the authors on request). Educational level and living arrangement were not significantly related to QoL. Single individuals reported significantly lower SF scores compared with the others. Older subjects reported higher QoL levels for mental (MCS) and social dimensions (SF and RE), patients living with children reported higher QoL levels for social dimensions (SF and RE), and employed patients reported higher QoL levels on physical dimensions (PF, V, and PCS). Depression was significantly associated with lower QoL (PF, SF, RP, RE, MH, V, and MCS).

In the multivariate analysis, no relationships were found between the various parameters and the SF-36 PCS. On the contrary, hormonal therapy and depression were independent predictive factors of the SF-36 MCS. All of the results are detailed in Table 3.

Table 3 Predictive factors for PCS and MCS: multivariate analysis (standardized beta coefficient)

		PCS	MCS
Age	β	–0.050	0.086
	P	0.810	0.549
Gender identity (0 MtF, 1 FtM)	β	–0.076	0.124
	P	0.653	0.288
Educational level (0 < 12 years, 1 ≥ 12 years)	β	0.041	–0.071
	P	0.763	0.451
Partnership status (0 not single, 1 single)	β	0.102	–0.068
	P	0.687	0.697
Employment status (0 no, 1 yes)	β	0.233	0.026
	P	0.098	0.787
Children at home (0 no, 1 yes)	β	–0.068	–0.054
	P	0.761	0.728
Sexual orientation (0 same biological sex, 1 others)	β	0.168	0.098
	P	0.419	0.496
Depression (0 no, 1 yes)	β	–0.180	–0.576
	P	0.226	**<0.001**
Hormonal therapy (0 no, 1 yes)	β	–0.255	0.226
	P	0.111	**0.044**

β = standardized beta coefficient (β represents the change of the standard deviation in quality of life score resulting from a change of one standard deviation in the independent variable); bold values: $P < 0.05$
PCS = physical composite score; MCS = mental composite score; MtF = male-to-female; FtM = female-to-male

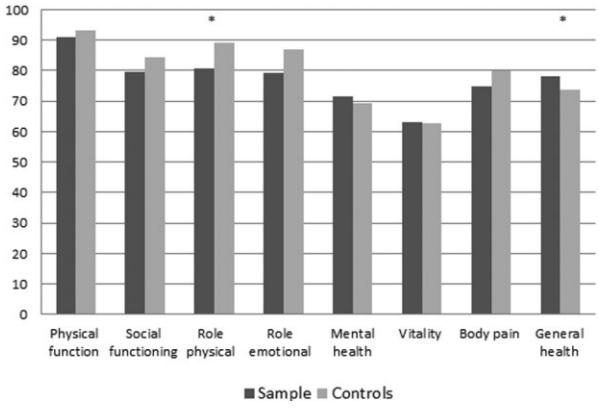

Figure 1 SF-36 scores between the 61 transsexual subjects and French age- and sex-matched controls. SF-36 = Short Form 36. *P value < 0.05.

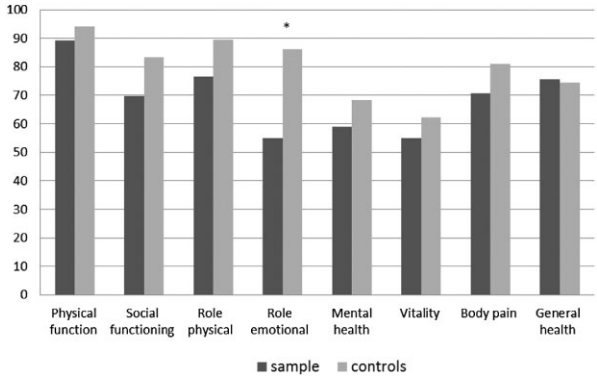

Figure 2 SF-36 scores between the 17 nonhormonal transsexual subjects and French age- and sex-matched controls. SF-36 = Short Form 36. *P value < 0.05.

Figure 1 shows the QoL differences between the 61 transsexuals and the age- and sex-matched controls. Transsexuals' QoL did not differ from French age- and sex-matched controls except for the RP score (lower scores in transsexuals, 80.7 ± 30.4 vs. 89.0 ± 2.9 for the controls, $P = 0.040$), indicating problems with occupational performance or daily activity performance as a result of physical health, and GH score (lower scores in controls, 73.7 ± 2.8 vs. 78.3 ± 16.0 for the transsexuals, $P = 0.031$). Figures 2 and 3 illustrate the QoL differences between the 17 nonhormonal transsexuals, the 44 hormonal transsexuals, and the age- and sex-matched controls. Hormonal transsexuals presented significantly higher scores on the MH (79.4 ± 16.1 vs. 73.4 ± 2.6, $P = 0.02$) and GH (79.4 ± 16.1 vs. 69.5 ± 2.3, $P = 0.001$) dimensions, whereas nonhormonal transsexuals reported lower scores than controls on the RE dimension (54.9 ± 40.7 vs. 86.2 ± 4.1, $P = 0.01$).

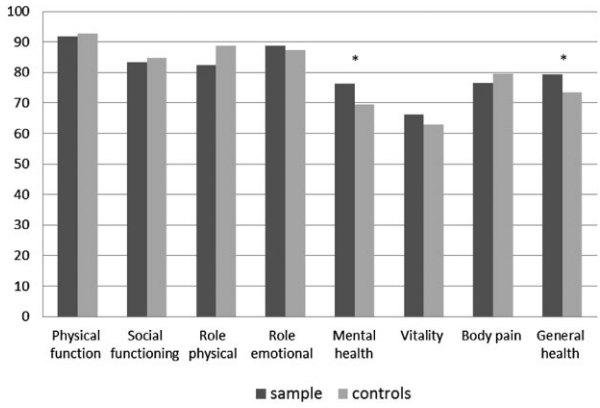

Figure 3 SF-36 scores between the 44 hormonal transsexual subjects and French age- and sex-matched controls. SF-36 = Short Form 36. *P value < 0.05.

Discussion

In the past few decades, the literature has addressed transsexuals' QoL, satisfaction [5,6,14,15], and various other outcomes such as sexual functioning after sex reassignment surgery [8,20]. Few data are available regarding the role of hormonal therapy in the daily lives of transsexuals without sex reassignment surgery. However, these data should provide pertinent information for both transsexuals and their healthcare providers. In light of the importance of this information, several interesting results of the current study must be discussed.

When accounting for potential confounding factors, the present results suggest that hormonal therapy is independently linked to better mental QoL. A previous study that attempted to determine whether hormonal therapy influences QoL [26] showed consistent results; even if the studied population was not strictly similar, it included transgender persons in the broad sense. Patients who received testosterone at any time reported statistically higher QoL SF-36 scores in four domains (V, SF, RE, and MH) and a higher MCS than those who did not receive testosterone. The initiation of hormonal therapy is a crucial part of the sex reassignment procedure. In our population, QoL can add important information to that, which is traditionally collected, especially as a confirmation of the "success" of the hormonal therapy and, consequently, in the choice of a sex reassignment surgery. Indeed, sex reassignment surgery is recommended only after the completion of at least 1 year of consistent and compliant hormonal treatment [4]. Future studies must address QoL outcomes during the hormonal therapy as preoperative factors that may be associated with more or less favorable outcomes of sex reassignment surgery.

Transsexuals, who are independent of hormonal status, seem to report similar or higher QoL levels compared with age- and sex-matched controls (except for the RP subscale, with lower scores reported by transsexuals). The specific management offered to our patients during the study may facilitate access to psychologists or other specific healthcare services and, thus, partially explain this finding. Another important finding is the disparity between the nonhormonal and the hormonal transsexuals, as hormonal therapy is associated with higher scores of general and MH, whereas the absence of hormones is associated with lower scores of the RE subscale. These results underline the suffering of nonhormonal transsexuals and the probable favorable evolution of their QoL with hormonal therapy in a sex reassignment procedure. Our results suggest the positive psychological effects of hormonal therapy rarely identified in previous reports [2,4]. It seems to suggest that treatment with hormones allows individuals to feel as good or better than controls. The last report of the French National Authority for Health mainly focused on the positive organic effects of hormonal therapy.

Consistent with previous studies, depression was related to poorer QoL. This relationship highlights the necessity of psychiatric evaluation to detect and to treat psychiatric disorders that have negative effects on QoL [13,16,17,19,31–33].

Although only hormonal therapy and depression were associated with QoL after adjusting for confounding factors, the findings of the univariate approach provided interesting information about sociodemographic and transsexual typology factors. These findings contradict the results of previous studies. In the current study, older transsexuals reported better QoL levels than their younger counterparts, whereas the previous literature reported that transsexuals with advanced age reported poorer QoL [10,11,19,31,32,34–38]. However, after adjusting for confounding factors, the link between age and QoL was not found due to the presence of the main confounding factor represented by the hormonal therapy group. Another hypothesis could be that older transsexuals had a longer duration of hormonal therapy than younger transsexuals and that the longer duration of hormone use was associated with better psychological adjustment [23]; however, no significant correlation was found between age and hormonal duration.

Gender identity was not associated with QoL in the present study, although previous studies have documented that FtM transsexuals presented higher QoL levels than MtF transsexuals [14]. Most of these studies evaluated QoL after sexual reassignment, and we can hypothesize that surgery is more beneficial in FtM than in MtF individuals. The mastectomy offered to FtMs can immediately be seen by others, in contrast to the vaginoplasty for MtFs. In any case, it is well recognized that FtMs have an easier transition because masculinity in females is generally more widely accepted by society than femininity in males.

Concerning sexual orientation, QoL was higher in individuals who were not sexually oriented toward the same biological sex. This finding seems contradictory to previous studies. Some authors have reported that homosexual transsexuals (those attracted to the same biological sex) exhibit better functioning in many respects than heterosexual transsexuals (identified as "others" in our study) [19,39]. However, one of these reports [19] involved postsurgical transsexuals and its results plausibly reflect emotions after sex reassignment surgery. Regarding our heterosexual subsample ("others"), the individuals are essentially MtF, older, less frequently single, and are more likely to have children than the homosexual individuals. This profile often corresponds to later sex reassignment requests with a first period of life that is successfully adapted to the biological sex. These three factors (being older, not being single, and having children) are known to be related to higher QoL scores. They can be considered confounding factors, reinforcing the need for a multivariate approach. In our study, sexual orientation did not influence QoL composite scores after adjustment.

Partnership status was associated with SF QoL in the present study and confirmed the results of Weyers et al. [5], who demonstrated that individuals who were involved in a relationship scored significantly higher on QoL scales than individuals who were not involved in a relationship. In the same way, employment status was associated with higher QoL levels as in previous studies [17,18]. These two aspects were also classically described in the general population.

Strengths and Limitations

1. This report considered only transgender people meeting the specific criteria of the multidisciplinary team. Regarding this last assertion, the French viewpoint differs from the American one. The French individuals enrolled in regular hormonal treatments are only those transsexuals fitting the strict definition. In contrast, many American healthcare locales are not organized with multidisciplinary teams for the diagnosis and treatment of transgender patients. There are many providers who are willing to offer hormonal treatment to those who do not fit the strict definition of transsexual and who are, thus, equally interested in findings both within and outside of organized care systems, as provided by the study of Newfield [26].
2. The sample size was small. When attempting to identify linked factors using the multivariate approach, moderate associations may have been missed because of low statistical power. This limitation is a frequent problem in this specific research area. Nevertheless, it can be assumed that a majority of individuals with gender identity disorders living in the geographic area had access to one of the three participant centers. Indeed, access to care for transsexuals seems to be easier in France with its free health system. Gender identity disorder is considered as a "long-term disease" allowing these individuals to have universal health coverage.
3. The representativeness of the sample should be discussed with respect to the literature. The MtF : FtM ratio (1:1) was similar to that of a German study [40] but different from that reported in other studies [41,42] with higher ratios [43,44] or lower ratios [45]. The selection of subjects without severe unstable psychiatric comorbidities may "inflate" the QoL scores that would otherwise be seen had those individuals not been excluded, restricting the representativeness of the sample.
4. Differences between the present study and a previous work that reported the potential effect of hormones on QoL using a large transgender sample [26] should be mentioned. First, the previous study collected data using the Internet, restricting its results to a specific socioeconomic population. Second, the previous studied population included heterogeneous subgroups with a variety of diagnoses (not only transsexuals), individuals in different phases of the gender transition process (e.g., testosterone usage or not, surgical procedures or not), and individuals with different healthcare status (e.g., regular contact or not). In contrast, the current study presented data from a homoge-

neous sample of transsexuals defined by a specialized multidisciplinary team using a typical and well-recognized diagnosis classification. Third, in the previous work, only two parameters were controlled (income and education); however, the current study accounted for 10 variables. Lastly, the method of data collection employed, in which individuals completed the self-reported QoL at the center, likely overestimated the QoL scores compared with questionnaires completed using the Internet. Participants may feel a bias toward reporting higher QoL scores when completing questionnaires through the centers that are providing their treatments, particularly if they have fears that their responses could affect their treatment, despite the fact that confidentiality and anonymity were assured. The two approaches provide complementary information that is very useful for MH care workers managing transsexual patients.

5. Dosage, molecule nature, length of treatment, and administration modalities of hormone therapy were not taken into account in our analyses. Future studies should integrate these parameters to more precisely examine the role of hormones in the life of transsexuals.
6. By definition, the individuals of the two groups, hormonal and nonhormonal therapy groups, were not in the same step or phase of the sex reassignment procedure, which may influence the reported QoL levels. In particular, the change in gender role among the hormonal group should probably directly influence the self-reported QoL. Indeed, the sex reassignment procedure may reinforce the gender affirmation with a better social recognition. Prospective studies provide more valid information than cross-sectional studies and are necessary to more accurately determine the impact of hormonal therapy among these populations. However, researchers in this field are aware of the great difficulty of finding patients who never take hormones.
7. The use of the shortened BDI as the depression assessment should be discussed. Although we appreciate the tool for its self-administering capacity and its short time of completion, we recognize that a larger assessment is necessary to more accurately diagnose depression.
8. Another limitation of the study concerns the selection of controls from the general population, which was based specifically on the French available norms.

Conclusion

Although transsexuals' QoL seems similar to the general population, the present study suggests a positive role of hormone therapy in the QoL of transsexuals. QoL can add important information to that which has been traditionally collected, especially as a confirmation of the "success" of hormonal therapy and, consequently, the choice of a sex reassignment therapy. These results must be confirmed using a longitudinal design, larger samples, and more precise hormone therapy characteristics.

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