



**Transgender and Anxiety: A comparative study between transgender people and the general population**

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## Abstract

**Background:** Anxiety disorders pose serious public health problems. The data available on anxiety disorders in the transgender population is limited by the small numbers, the lack of a matched controlled population and the selection of a non-homogenous group of transgender people.

**Aims:** The aims of the study were (1) To determine anxiety symptomatology (based on the HADS) in a non-treated transgender population and to compare them to a general population sample matched by age and gender; (2) To investigate the predictive role of specific variables, including experienced gender, self-esteem, victimization, social support, interpersonal functioning and cross-sex hormone use regarding levels of anxiety symptomatology; (3) To investigate differences in anxiety symptomatology between transgender people on cross-sex hormone treatment and those who are not.

**Methods:** A total of 913 individuals, who self-identified as transgender attending a transgender health service during a three-year period agreed participation. For the first aim of the study 592 transgender people not on treatment were matched by age and gender with 3816 people from the general population. For the second and third aim the whole transgender population was included.

**Measurements:** Socio-demographic variables and measures of depression and anxiety (HADS), self-esteem (RSE), victimisation (ETS), social support (MSPSS), and interpersonal functioning (IIP-32).

**Results:** Compared with the general population transgender people had a nearly 3-fold increased risk of probable anxiety disorder (all  $p < .05$ ). Low self-esteem and interpersonal functioning were found to be significant predictors of anxiety symptoms. Trans women on treatment with cross-sex hormones were found to have lower levels of anxiety disorder symptomatology.

**Conclusions:** Transgender people (particularly trans males) have higher levels of anxiety symptoms suggestive of possible anxiety disorders, when compared to the general population. The findings that self-esteem, interpersonal functioning and hormone treatment is associated with lower levels of anxiety symptoms indicate the need for clinical interventions targeting self-esteem and interpersonal difficulties as well as the importance of quick access to transgender health services.

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3 **Key words:** Transgender; Gender Dysphoria; anxiety; mental health; HADS; self-  
4 esteem; interpersonal functioning; cross-sex hormone treatment  
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For Peer Review Only

## Introduction

Transgender people are a diverse population of individuals who do not present and/or identify as the gender they were assigned to at birth, either some or all of the time (Richards and Barker, 2013). Transgender identities include women and men, who feminize or masculinize their bodies with cross-sex hormone treatment (CHT) and/or gender confirming surgery (GCS), and other gender-variant individuals, who may identify and/or present in a way which is outside the gender dichotomy of man/woman (Richards et al., 2016).

Transgender people have been found to face a number of difficulties and interpersonal challenges (such as disclosing their gender identity) (Bockting and Coleman, 2016). They have been found to suffer from high levels of discrimination and victimization (Claes et al., 2015; Kattari et al., 2015; Leppel, 2016; Lombardi et al., 2001) as well as rejection from family and loved ones (Koken et al., 2009). Possibly as a consequence, many transgender people have low self-esteem (Erich et al., 2010) and high prevalence rates of mental health problems, particularly anxiety disorders and depression (Arcelus et al., 2016; Bockting et al., 2013; Claes et al., 2015; Davey et al., 2014, 2016; Dhejne et al., 2016; Heylens et al., 2014a).

Research in the transgender population pre-treatment using cross sectional data, have shown high levels of anxiety symptomatology in this population (Bockting et al., 2013; de Vries et al., 2011; Heylens et al., 2014a; Reisner et al., 2015, 2016). High levels of anxiety symptomatology are particularly prevalent in transgender people before treatment (Bergero-Miguel et al., 2016; Colizzi et al., 2013; de Vries et al., 2011; Gómez-Gil et al., 2012; Heylens et al., 2014a).

Research looking at anxiety symptoms and anxiety disorders in the transgender population have found an association with frequent experiences of discrimination in employment and housing, violence, physical and verbal abuse, societal harassment related to gender presentation, perceived need to keep one's transgender identity a secret and lack of gender confirming treatment (Bockting et al., 2013; Clements-Nolle et al., 2006; McNeil et al., 2012). Some of these findings support the minority stress theory (Bockting et al., 2013; Meyer, 1995; 2003). However, these studies are

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3 limited by the small numbers of transgender people as well as heterogeneity of the  
4 group (for instance, people at different stages of transition).  
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8 Several studies have looked at to the role of gender confirming medical treatment  
9 (cross-sex hormone treatment (CHT) and gender affirming surgery (GAS)) in anxiety  
10 symptoms among the transgender population (Bouman et al., 2016a; Colizzi et al.,  
11 2013, 2014; Davis and Colton Meier, 2014; De Vries et al., 2014; Dhejne et al., 2016;  
12 Gomez-Gil et al., 2012; Heylens et al., 2014b; Meier et al., 2011). These studies  
13 showed that gender confirming medical treatment improves mental health, including  
14 anxiety symptomatology. However, the results are not consistent (e.g., Reisner et al.,  
15 2015) and limited by a small sample size (e.g., De Vries et al., 2014; Heylens et al.,  
16 2014b) or by the lack of matched controls (e.g., Colizzi et al., 2013, 2014; Davis and  
17 Colton Meier, 2014; Gomez-Gil et al., 2012).  
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26 This study addresses the aforementioned limitations of a small sample size, a lack of  
27 homogeneity and a matched control group. The current study investigates the  
28 prevalence of possible or probable anxiety disorder in a large cohort of adult  
29 transgender people, who seek treatment at a national transgender health service;  
30 and the study compares this large cohort of adult transgender people to general  
31 population data matched by age and gender (experienced gender).  
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38 This study has several aims. Firstly, to determine the levels of anxiety  
39 symptomatology suggesting possible and probable anxiety disorder in non-treated  
40 transgender people and to compare them with a cisgender (cis) population matched  
41 by age and gender. Secondly, to investigate the predictive role for anxiety disorders  
42 (possible and probable) of specific variables known to be associated with anxiety  
43 symptoms in the cisgender and transgender population such as age, gender, self-  
44 esteem, social support, interpersonal functioning and victimisation and the use of  
45 CHT in transgender people (Bouman et al., 2016a; Claes et al., 2015; Colizzi et al.,  
46 2014; Davey et al., 2014, 2015; Gomez-Gil et al., 2012; Kessler et al., 2005a;  
47 Kessler et al., 2005b; McLean et al., 2011; Meier et al., 2011). Finally, to investigate  
48 differences in anxiety scores between transgender people on cross-sex hormone  
49 treatment (CHT) with those not on cross-sex hormone treatment (non-CHT). For the  
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3 last two aims the whole population of transgender people (on CHT and not on CHT)  
4 will be selected.  
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8 Based on the literature regarding anxiety and transgender people, it was  
9 hypothesized that levels of anxiety will be higher in the transgender population  
10 compared to the general population, and associated with psychopathology,  
11 decreased self-esteem and social support, discrimination, lower levels of  
12 interpersonal functioning and lack of CHT treatment. There is no clear hypothesis  
13 regarding the relationship between gender and anxiety symptoms. Studies in the  
14 general population suggest that cisgender women present with higher levels of  
15 anxiety symptoms than cisgender men, which may suggest that trans women  
16 present with higher anxiety symptoms too. There is, however, also the possibility  
17 that genetic factors play a role in the aetiology of anxiety disorders, and  
18 consequently a predisposition to develop anxiety disorders may relate to one's  
19 assigned gender at birth.  
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## 28 29 **Methods**

### 30 *Participants and Procedures*

#### 31 Transgender participants

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33 The sample consisted of all individuals who self-identify as transgender and attended  
34 for an assessment to a national transgender health service in X during a 3-year  
35 period, between November 2012 and October 2015. For the first aim of the study  
36 only individuals not on treatment with cross-sex hormones (non-CHT) before  
37 assessment will be selected in order to have a homogeneous group.  
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39 Following assessment, the transgender person is considered for entry into the  
40 treatment programme. Treatment, including CHT and GAS is free at the point of  
41 access in the National Health Service (NHS) in the United Kingdom for all citizens.  
42 Patients will usually start CHT, following informed consent, if there are no physical  
43 contraindications. Chest reconstructive surgery is generally available to trans men  
44 after being on testosterone treatment for a minimum of 6 months. Genital  
45 reconstructive surgeries are generally available to transgender people after being in  
46 the treatment programme for a minimum of 12 months. We acknowledge that not all  
47 transgender people wish to take cross-sex hormones or undergo gender confirming  
48 surgeries; a growing number of transgender people express a wish for partial  
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3 treatment (Beek et al., 2015). Once transgender people have undergone their  
4 desired treatment, follow-up care can be organised at the service, if they wish (Wylie  
5 et al., 2014).  
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8 Prior to the clinical assessment every patient was invited to participate in the study,  
9 and if agreed to complete a battery of questionnaires. The study received ethical  
10 approval from the NHS Ethics committee and from the Research and Development  
11 Department from X in line with Health Research Authority guidance (HRA, 2013).  
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### 15 16 Control group

17 A total of 3816 adults from the general population with an age range of 16-92 who  
18 participated in another study (Crawford et al., 2009) was used as controls and  
19 matched by age and gender. These samples were recruited between 2006 and  
20 2009. In order to increase the normative data, a broad representation of the general  
21 adult UK population was selected, in terms of the age, education, and gender  
22 (although, in most cases, females were over sampled). The recruitment process  
23 included a variety of sources such as large and small businesses, public service  
24 organizations, community centres, and recreational groups. The majority of  
25 participants were recruited from urban/ suburban locations, although rural/semi-rural  
26 people were also represented. As per the transgender group, participants were  
27 invited to complete the Hospital Anxiety and Depression Scale (Zigmond & Snaith,  
28 1983) and place them in a sealed envelope. The questionnaires were filled out  
29 anonymously. The combined refusal/non-return rates ranged from approximately  
30 17% to 21%.  
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43 Ethical approval was obtained from the Psychology Ethics Committee of the  
44 University of X.  
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### 48 **Main Outcome Measures**

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50 The **Hospital Anxiety and Depression Scale** (HADS) (Zigmond & Snaith, 1983) is  
51 a 14-item self-report screening scale that was originally developed to indicate the  
52 possible presence of anxiety and depression states in the setting of a medical non-  
53 psychiatric outpatient clinic. HADS consists of two subscales, HAD-Anxiety (HAD-A)  
54 and HAD-Depression (HAD-D). For this study only the subscale of anxiety will be  
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3 used. This subscale has seven items, rated on a 4-point Likert scale (ranging from,  
4 as much as I always do (0); not quite so much (1); definitely not so much (2); to not  
5 at all (3)), indicating symptoms of anxiety during the preceding week. A score of 0-7  
6 on either scale is regarded as being in the normal range (no symptoms), a score of  
7 8-10 is suggestive of the presence of an anxiety disorder (possible symptoms), and a  
8 score of 11 or higher indicates the probable presence of an anxiety disorder  
9 (symptoms) of the respective state. Maximum subscales scores are 21 for anxiety.  
10 The HADS was found to perform well in assessing the symptom severity and  
11 caseness of anxiety disorders in both somatic, psychiatric and primary care patients  
12 and in the general population (Bjelland et al., 2002) and it has been previously used  
13 with transgender individuals (Bouman et al., 2016a; Gomez-Gil et al., 2012). A  
14 number of researchers have explored HADS data to establish the cut-off points for  
15 caseness of anxiety. Bjelland et al. (2002) through a systematic review of a large  
16 number of studies identified a cut-off point of 8/21 for anxiety. For anxiety (HADS-A)  
17 this gave a specificity of 0.78 and a sensitivity of 0.9. In this study, the Cronbach's  
18 alpha was 0.68 for the anxiety scale.  
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31 The **Rosenberg Self-Esteem Scale** (RSE) (Rosenberg, 1965) is a self-report  
32 measure of global self-esteem. Items are rated on a 4-point rating scale ranging from  
33 0 ('Strongly disagree') to 3 ('Strongly agree'). Its total score is calculated by summing  
34 the item scores with higher scores indicating higher self-esteem. The RSE has been  
35 empirically validated and administered previously to transgender individuals (Arcelus  
36 et al., 2016; Vocks et al., 2009). In this study the Cronbach's alpha was 0.91.  
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43 The **Experiences of Transgender Phobia Scale** (Lombardi et al., 2001) assesses  
44 experiences of discrimination or victimization on the basis of gender identity or  
45 gender presentation. The questionnaire was based on the Transgender Violence  
46 Study and measured people's lifetime experiences of violence and harassment and  
47 experiences of any form of economic discrimination as a result of being transgender  
48 (e.g., verbal abuse, physical abuse, fired from a job, problems getting a job, and  
49 problems getting health or medical services due to gender identity or presentation).  
50 All five items are to be rated on a four-point Likert scale ranging from 0 ('never') to 3  
51 ('several times'). This scale has been previously used with transgender individuals  
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3 (Arcelus et al., 2016; Bouman et al., 2016a,b; Claes et al., 2015). In this study the  
4 Cronbach's alpha was 0.59.  
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8 The **Multidimensional Scale of Perceived Social Support** (MSPSS) (Zimet et al.,  
9 1990) is a 12-item, self-report scale designed to tap social support from family,  
10 friends, and significant others. Items are rated on a 7-point Likert scale ranging from  
11 1 ('very strongly agree') to 7 ('very strongly disagree'). The instrument includes three  
12 subscales to address these three types of support (family, friends, significant others).  
13 The mean total and subscale scores range from 1 to 7, and a higher score indicates  
14 greater perceived social support. This scale has recently been used in transgender  
15 populations (Boza et al., 2014; Davey et al., 2014, 2016). In this study the  
16 Cronbach's alpha was 0.89 for the total scale.  
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24 The **Inventory of Interpersonal Problems** (IIP-32) (Barkham et al., 1996)  
25 measures interpersonal difficulties. It consists of 32 items to be rated on a 5-point  
26 Likert scale ranging from 0 ('Not at all') to 4 ('Extremely'). There are eight subscales  
27 of interpersonal problems: *Hard to be Assertive*, *Hard to be Sociable*, *Hard to be*  
28 *Supportive*, *Hard to be Involved*, *Too Dependent*, *Too Caring*, *Too Aggressive*, and  
29 *Too Open*. A total mean score provides a global measure of interpersonal distress.  
30 Higher subscale scores indicate greater interpersonal difficulties. The IIP-32 is a  
31 shortened version of the original IIP, yet the psychometric properties are retained; a  
32 confirmatory factor analysis demonstrated high reliability with alpha coefficients of  
33 0.70 to 0.88 (Barkham et al., 1996). The IIP-32 has been used successfully in both  
34 non-clinical (Berry et al., 2006) and clinical samples (Bouman et al., 2016b; Davey et  
35 al., 2015). In this study the Cronbach's alpha was 0.87 for the total scale.  
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#### 46 **Data Analysis**

47 All quantitative data analyses were performed by means of SPSS 22 (IBM, 2013).  
48 First descriptive statistics were applied. For the first aim, only transgender people will  
49 be included in order to have a homogenous group. As per the authors advice based  
50 on the HADS three categories will be developed: 1) people with no anxiety disorder,  
51 2) people with symptoms suggesting of a possible anxiety disorder and, 3) people  
52 with symptoms suggesting a probable anxiety disorder. We used the Chi-Square  
53 Test Statistic to calculate the association between the three levels of anxiety  
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3 symptomatology and the participant status (transgender and controls) for the total  
4 group and for males/females separately. For the second aim, the prediction of the  
5 presence/absence of an anxiety disorder based on self-esteem, social support,  
6 interpersonal functioning and victimization and the use of CHT in transgender people  
7 controlled for gender and age, we performed a hierarchical regression analysis, with  
8 the presence/absence of the anxiety disorder as a dependent variable (dummy), age  
9 and gender (step 1) as control variables and the other variables (step 2) as  
10 predictors. For the third aim, the association between the presence/absence of an  
11 anxiety disorder and the use/not use of CHT, we calculated the Chi Square Test  
12 Statistic for the total group, and males/females separately. The level of significance  
13 used was  $p < 0.05$ .

## 23 Results

### 24 *Socio-demographic characteristics of the whole sample regarding*

25 During the recruitment period of 3 years 913 individuals who fulfilled the inclusion  
26 criteria agreed to participate. Twenty-five individuals (2.6%) did not agree  
27 participation, which gives a response rate of 97.4%. The age range of the  
28 participants was 15-79 years with a mean age of 30.4 years (SD= 13.9); 582 (63.7%)  
29 patients identified themselves as **trans females** (assigned male at birth) and 331  
30 (36.3%) as **trans males** (assigned female at birth). Of the total sample of 913  
31 transgender people 640 (70,1%) were not on cross-sex hormone treatment, 259  
32 (28.4%) were on CHT, whilst for 14 patients (1.5%) this information was not available  
33 and they were removed for further analyses.

### 34 *Comparative analyses between transgender people not on CHT and controls.*

35 For the first aim of the study only people not on CHT were selected (n=640). Of the  
36 640 patients in the non-CHT group the age range was 16-79 years with a mean age  
37 of 28.6 years (SD= 12.8); 393 (61.4%) patients identified as **trans females** (assigned  
38 male at birth) and 247 (38.6%) were **trans males** (assigned female at birth). This  
39 group was matched by age and experienced gender with the control group. Of the  
40 640 patients in the non-CHT group 48 (7.5%) could not be matched due to  
41 insufficient numbers for that age in the control data. This group consisted of 19 **trans**  
42 **females** and 28 **trans males** aged 17 and 18 with an average age of 17.3 years (SD=  
43 0.48). The remaining sample of 592 non-CHT patients were block matched with the  
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3 control population data base. This meant that for the first aim, a total of 1184  
4 participants were selected, 592 in each group.  
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8 Out of the 592 transgender and cisgender participants, 218 (36.8%) were **trans and**  
9 **cis females** and 374 (63.2%) were **trans and cis males** respectively. As Table 1  
10 shows the control group were significantly more prevalent in the category of 'No  
11 Anxiety Disorder' compared to the transgender group, whereas the transgender  
12 people were significantly more prevalent in the categories 'Possible and Probable  
13 Anxiety Disorder' compared to the control group. This difference was statistically  
14 significant [ $X^2_{(2)} = 148.997, p < .001$ ]. When comparing **trans with cis men** [ $X^2_{(2)} =$   
15  $128,521, p < .001$ ] and **trans with cis women** [ $X^2_{(2)} = 21,443, p < .001$ ], the difference  
16 was still statistically significant.  
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25 (Insert Table 1. about here)  
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28 *Predictors of anxiety disorders (probable and possible) among the whole*  
29 *transgender population*  
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33 In order to analyze the predictors of anxiety in the transgender population, the whole  
34 group of 913 transgender people (excluding the 14 people without information  
35 regarding CHT), were included (giving a total of 899 individuals). Those in the  
36 category of probable and possible anxiety symptoms were grouped together into one  
37 category (anxiety disorder). A linear hierarchical regression analysis with the  
38 presence or absence of anxiety disorder as dependent variable, age and gender as  
39 control variables, and self-esteem, social support, interpersonal functioning and  
40 victimization and presence and absence of CHT as independent variables was  
41 performed. The results showed that low self-esteem and interpersonal problems  
42 were the only significant predictors for a transgender person attending transgender  
43 health services to suffer from a possible and probable anxiety disorder.  
44 Interpersonal functioning was a stronger predictor (See Table 2).  
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### *Comparison between people on CHT and those not on CHT*

Analyses comparing transgender people on CHT with those not on CHT found a statistically significant difference between both groups with more transgender people using CHT in the category of no anxiety disorder compared to those on not on CHT [ $X^2_{(1)} = 20,266, p < .001$ ]. The latter group is more prevalent in the category anxiety disorder (see Table 3.). As the use of CHT was more prevalent among **trans females** and anxiety symptoms were more prevalent among **trans men** the same analyses were performed according to gender. The new analyses showed that for trans females being on CHT was associated with less anxiety disorder as there were more trans females not on CHT in the category of anxiety disorders when compared to trans females on CHT [ $X^2_{(1)} = 21,802, p < .001$ ]. This was not the case for **trans males** [ $X^2_{(1)} = 1,379, p < .240$ ].

(Insert Table 3 about here)

### **Discussion**

Anxiety disorders are the most common mental disorders, with a reported 12-month prevalence of 18.1% and a lifetime prevalence of 28.8% (Kessler et al., 2005a; Kessler et al., 2005b). Moreover, women are significantly more likely than men to develop an anxiety disorder throughout the lifespan (McLean et al., 2011). Owing to their high prevalence, combined with an often early onset and chronic course, anxiety disorders are the second most important cause of disability worldwide within the group of mental and behavioural disorders (Whiteford et al., 2013; de Vries et al., 2016). This study found high rates of possible (32.8%) and probable (36.0%) **current** anxiety disorder in untreated transgender people attending a transgender health service. Compared with a cisgender matched control group from the general population, transgender people had an almost 3-fold increased risk of probable anxiety disorder. **Trans males** showed higher rates of possible and probable anxiety disorder (71.1%) than **trans females** (59.8%), which would be in keeping with the

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3 literature on gender differences in anxiety disorders, if the pattern of birth gender is  
4 followed (McLean et al., 2011). Studies looking as to why anxiety symptoms are  
5 more prevalent among individuals whose gender is assigned female at birth, suggest  
6 that differences in neurobiological make-up may account for these differences. The  
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8 The brain system involved in the fight-or-flight response is activated more readily in  
9 female-assigned-at-birth individuals and stays activated longer than male-assigned-  
10 at-birth individuals, partly as a result of the action of estrogen and progesterone. The  
11 neurotransmitter serotonin may also play a role in responsiveness to stress and  
12 anxiety. Some evidence suggests that the brain of individuals, whose sex is  
13 assigned female at birth does not process serotonin as quickly as their male  
14 counterparts. Recent research has also found that female-assigned-at-birth  
15 individuals are more sensitive to low levels of corticotropin-releasing factor (CRF), a  
16 hormone that organizes stress responses in mammals, making them twice as  
17 vulnerable as their male-assigned-at-birth counterparts to stress-related disorders  
18 (Bangasser et al., 2016).

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20 This study found low self-esteem and interpersonal functioning to be predictors of  
21 anxiety disorder, which highlights the importance of psychological intervention and  
22 support in this vulnerable group. Psychological treatment aiming at improving self-  
23 esteem and interpersonal functioning may help transgender individuals at risk of  
24 developing anxiety disorder when going through the transitional process. Various  
25 psychological treatments have proven efficacious in increasing self-esteem (Morton  
26 et al., 2012; Fennel, 2006; Rigby and Waite, 2007). Similarly, interpersonal  
27 psychotherapy (IPT) has been found efficacious in reducing interpersonal problems.  
28 As IPT has been successfully used in various populations (e.g., Arcelus et al., 2011;  
29 Hara et al., 2000; Mufson et al., 2013), it could be adapted for use within the  
30 transgender population (Budge, 2013). For those transgender patients who meet a  
31 diagnosis of anxiety disorder current treatment approaches apply, including  
32 consideration of pharmacotherapy and/or psychological treatment (Baldwin et al.,  
33 2014; Iacoviello & Charney, 2015).

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35 Further findings confirmed the benefits of cross-sex hormone treatment, particularly  
36 for trans women on CHT, as they were significantly more prevalent in the category  
37 no anxiety disorder compared to those who do not use cross-sex hormones. That  
38 these findings do not apply to trans men is surprising, and certainly do not reflect our  
39 clinical experience. One explanation may be that the higher risk of developing  
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3 anxiety disorder for people whose sex is female assigned at birth offsets the positive  
4 psychological benefits of CHT in **trans men**. This specific area needs further study.  
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6 The findings confirm existing research (Gomez-Gil et al., 2012; Colizzi et al., 2014;  
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8 De Vries et al., 2014; Heylens et al., 2014b; Bouman et al., 2016) and add further  
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10 weight to the rationale of early treatment for gender dysphoria. In many countries,  
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12 long waiting lists and lack of clinical services for transgender people combined with  
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14 overly prescriptive pathways to access CHT in Standards of Care (Coleman et al.,  
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16 2012; Wylie et al., 2014) continue to be significant barriers to treatment for  
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18 transgender people. Moreover, these barriers to access treatment are likely to  
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20 further increase the rate of anxiety disorders; also, they tend to lead to self-  
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22 prescribing via the Internet without medical supervision (Mepham et al., 2014).

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24 There are aspects of the study that warrant attention in relation to limitation of the  
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26 results. First, the study is limited by selecting a specific population of treatment  
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28 seeking individuals and doing so in a country in which the waiting list for a first  
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30 appointment at a transgender health service is long. Hence, the results may not be  
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32 generalizable to other transgender people who do not access clinical services or to  
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34 other countries with different healthcare systems. Second, the research makes use  
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36 of self-reported questionnaires, and although most are adequately validated and  
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38 have been used in transgender populations, future research could use structured  
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40 clinical interviews to differentiate the clinical group from those with and without  
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42 anxiety disorder and other psychiatric morbidity. Furthermore, a limitation of the  
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44 study is the cross-sectional nature of the data. From the current data, it is not  
45  
46 possible to determine whether the psychological benefits associated with the use of  
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48 CHT predate or are a consequence of disclosure of experienced gender and/or  
49  
50 social gender role transition. It also may be that those with better self-esteem and  
51  
52 less psychopathology feel more confident to commence treatment without medical  
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54 advice. They may use the support and advice of their friends who also may be taking  
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56 CHT. The lack of information regarding the gender identity of the control group used,  
57  
58 makes it impossible to generalize the results to the transgender population, as some  
59  
60 of people in control group may also identify as transgender. This information was not  
asked, although, given the low prevalence the impact on the final results is likely to  
be negligible (Arcelus et al., 2015). **Many studies in the field of transgender health  
have included people fulfilling a diagnosis as per the ICD or DSM (e.g., Colizzi et al.,**

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3 2013; de Vries et al., 2011; Gómez-Gil et al., 2012; Heylens et al., 2014<sup>a</sup>) as well as  
4 relying on self-identification regarding one's gender (e.g., Bockting et al., 2013; Davis  
5 & Colton Meier, 2014; Reisner et al., 2016; Warren et al., 2016). This study has not  
6 used a diagnosis to classify people, but selected a population of people who self-  
7 identify as transgender and access transgender health services for treatment. It can  
8 be argued that the population selected in this study may be slightly different to the  
9 one fulfilling diagnostic criteria, although this is not our clinical impression, but we do  
10 want to acknowledge this difference. A final note on the generalizability of the

11 findings is that there are particularities with regards to medical treatment and  
12 legislation for transgender person people in the UK. For example, some aspects of  
13 gender reassignment treatment (e.g. CHT and/or GCS) are available through the  
14 NHS free at the point of access, and the Gender Recognition Act 2004 provides legal  
15 recognition of a trans individual's experienced gender. In addition, the Sex  
16 Discrimination (Gender Reassignment) Regulations Act 1999, and its amendment in  
17 2008, deemed it unlawful to discriminate on the basis of gender reassignment within  
18 employment and vocational training, as well as within the provision of goods,  
19 facilities, and services. Consequently, the experience of living as a transgender  
20 person in the United Kingdom may be different from living as a transgender person  
21 in other countries (Davey et al., 2015).

22 In spite of the above limitations the strength of the paper is the large group of  
23 transgender and control group involved, making this one of the largest studies in this  
24 field. The study is also strengthened by the matching of groups (transgender and  
25 controls and transgender on CHT and not on CHT). The lack of matching between  
26 groups in the transgender literature has been criticized previously (Dhejne et al.,  
27 2016).

28 Notwithstanding the aforementioned limitations, this study clearly shows that  
29 treatment-seeking transgender individuals have a high prevalence rate of possible  
30 and probable anxiety disorder compared to the general population. Having an  
31 experienced male gender, low self esteem, interpersonal problems and lack of cross-  
32 sex hormone treatment are specifically associated with an increased likelihood of co-  
33 existing anxiety disorder in transgender people, having low self esteem and  
34 interpersonal problems being the main predictors for anxiety. Mental health services

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3 should take heed of these findings to improve outcomes in this vulnerable group of  
4 individuals.  
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### 7 8 **Disclosure of interest**

9  
10 The authors declare that they have no conflicts of interest concerning this article.  
11

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**Table 1: Comparison between the number of transgender (TG) people (men, women and total) and cisgender controls regarding the existence or not of anxiety disorders (n=1184)**

	Both Genders (n=1184)				Trans males (n=436)		Trans females (n=748)	
	TG (n=592)	Controls (n=592)	TG (n=218)	Controls (n=218)	TG (n=374)	Controls (n=374)		
No Anxiety disorder n(%)	185 (31.2)*	388 (65.5)*	72 (33.0)*	120 (55.0)*	113 (30.2)*	268 (71.6)*		
Possible n(%)	194 (32.8)	126 (21.3)	67 (30.7)	58 (26.6)	126 (33.7)	68 (18.2)		
Anxiety disorders n(%)	407 (68.8)*	204 (34.5)*	146 (67.0)*	98 (45.0)*	261 (69.8)*	106 (28.4)*		
Probable n(%)	213 (36.0)	78 (13.2)	78 (36.3)	40 (18.4)	133 (36.1)	38 (10.2)		

\*p<.05

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**Table 2. Predictive role of age, gender, self-esteem, social support, interpersonal function and victimization in transgender people with possible and probable anxiety disorder (as one category) compared to transgender people with no anxiety disorder.**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	p
1	(Constant)	,824	,076		10,780	,000
	Age	-,005	,001	-,143	-3,830	,000
	Assigned Gender	-,028	,037	-,028	-,751	,453
2	(Constant)	,634	,107		5,911	,000
	Age	,001	,001	,028	,812	,417
	Assigned Gender	,008	,031	,008	,239	,811
	CHT pre assessment	-,001	,013	-,001	-,043	,966
	Global score MSPSS	-,002	,001	-,056	-1,754	,080
	Total RSE	-,019	,003	-,259	-6,404	,000
	Global IIP score	,256	,028	,348	9,243	,000
	Total Transphobia	,006	,006	,030	1,002	,317

a. Dependent Variable: HADS score; \* p < 0.05



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**Table 3. Differences in anxiety symptomatology based on the HADS in transgender people on cross-sex hormone treatment (CHT) and those who are not on treatment (n= 899)**

	Transgender people not on CHT N(%)			Transgender people on CHT (N(%))		
	All (n=640)	Trans female (n=393)	Trans male (n=247)	All (n=259)	Trans female (n=179)	Trans male (n=80)
No Anxiety disorder (Score 0-7)	202 (31.5)*	118 (30.0)*	84 (34.0)	123 (47.5) *	90 (50.3)*	33 (41.2)
Possible or probable anxiety disorder (Score ≥ 8)	438 (68.5)*	275 (70.0)*	163 (66.0)	136 (52.5)*	89 (49.7)*	47 (58.8)

\*p < 0.05