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Risk factors for eating disorder psychopathology within the treatment seeking transgender population: The role of cross-sex hormone treatment

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Risk factors for eating disorder psychopathology within the treatment seeking transgender population: The role of cross-sex hormone treatment

Running head: Eating disorder psychopathology in transgender people

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Abstract

Many transgender people experience high levels of body dissatisfaction, which is one of numerous factors known to increase vulnerability to eating disorder symptoms in the cisgender (non-trans) population. Cross-sex hormones can alleviate body dissatisfaction so might also alleviate eating disorder symptoms. This study aimed to explore risk factors for eating disorder symptoms in transgender people and the role of cross-sex hormones. Individuals assessed at a national transgender health service were invited (N=563). Transgender people not on cross-sex hormones reported higher levels of eating disorder psychopathology than people who were. High body dissatisfaction, perfectionism, anxiety symptoms and low self-esteem were risk factors for eating psychopathology but, after controlling for these, significant differences in eating psychopathology between people who were and were not on cross-sex hormones disappeared. Cross-sex hormones may alleviate eating disorder psychopathology. Given the high prevalence of transgender identities, clinicians at eating disorder services should assess for gender identity issues.

Key words: transgender, eating disorder psychopathology, risk factors, cross-sex hormones, body dissatisfaction

Introduction

Eating disorder psychopathology, which includes restrictive eating, binge eating and compensatory behaviours (e.g., self-induced vomiting, misuse of diet pills and laxatives), has been found to be more prevalent among adolescent girls and young adult women compared to men (e.g., Duncan, Ziobrowski, & Nicol, 2017; Fairburn & Harrison, 2003). Body dissatisfaction (i.e., the negative evaluation of one's appearance; which is also more prevalent among adolescents and young people), has consistently been associated with eating disorder psychopathology in both females and males (e.g., Keel, Fulkerson, & Leon, 1997; Stice & Shaw, 2002; Wang, Lydecker, & Grilo, 2017). Body dissatisfaction is influenced by Western society's view of beauty (e.g., Fitzsimmons-Craft, 2011). As a consequence, women who are dissatisfied with their bodies often strive to obtain a thin body, while men are more likely to strive to obtain a muscular physique (e.g., Grogan, 2016; McCreary & Sasse, 2000). There are certain populations that have been found to be at increased risk of high levels of body dissatisfaction, such as the lesbian, gay, bisexual and transgender (LGBT) community (e.g., Calzo, Blashill, Brown, & Argenal, 2017; McClain & Peebles, 2016; Morgan & Arcelus, 2009). Within this group, transgender people are particularly vulnerable to body dissatisfaction due to the distress and incongruence they experience with their gender and body, yet this population is severely under researched in relation to eating disorders psychopathology (Jones, Haycraft, Murjan, & Arcelus, 2016; Witcomb et al., 2015).

Transgender people experience incongruence between their gender assigned at birth (determined from their sex characteristics (i.e., genitals)) and the gender they identify with. Transgender men are assigned female at birth but identify as male, while transgender women are assigned male at birth but identify as female (Arcelus & Bouman, 2017a; Bouman et al., 2017a). Cisgender people (non-transgender) do not experience such incongruence. Prior to

undergoing gender affirming medical interventions (e.g., cross-sex hormone treatment (CHT), gender affirming surgery), many treatment seeking transgender people are dissatisfied with their body shape and/or weight, which may put them at risk of developing an eating disorder (Witcomb et al., 2015). It has been hypothesised that it is the body dissatisfaction (a common feature of eating disorder psychopathology), linked to the wish to achieve a masculine or feminine body ideal, which influences the development of eating disorder psychopathology, specifically drive for thinness and bulimia, among transgender people (Ålgars, Alanko, Santtila, & Sandnabba, 2012; Bouman & Arcelus, 2016; Khoosal, Langham, Palmer, Terry, & Minajagi, 2009). In addition, it has also been hypothesised that the wish to stop menstruation and puberty, as well as not wanting to develop a feminine body shape (such as the development of breasts), can also play a role in the development of an eating disorder in transgender males (Bouman & Arcelus, 2016). This may explain why disordered eating has been found to be prevalent in transgender adolescents (Watson, Veale, & Saewyc, 2017). For example, Diemer, Grant, Munn-Chernoff, Patterson and Duncan (2015) found that transgender adolescents more frequently self-reported an eating disorder diagnosis in the past year (15.84%), and presented with eating disorder symptoms such as the use of diet pills (13.50%), self-induced vomiting and laxative abuse (15.61%), compared to cisgender adolescents.

As well as presenting to transgender health services with symptoms of an eating disorder, transgender people may initially present to eating disorder services. Case studies have reported on individuals who first present with eating disorder symptoms (e.g., food restriction, vomiting and body image distortion) without disclosing their transgender identity which, through exploration, has later been expressed as a desire to achieve a masculine or feminine body (different to the body associated with their gender assigned at birth) and,

hence, identified as secondary to their gender identity (e.g., Couturier, Pindiprolu, Findlay, & Johnson, 2015; Winston, Acharya, Chaudhuri, & Fellowes, 2004). These findings are concerning considering that gender incongruence is not routinely assessed within eating disorder services given that the prevalence of transgender people is considered to be low. However, recently the prevalence of transgender people has increased and there has been a significant increase in demand for transgender health services across Europe and North America (Aitken et al., 2015; Arcelus et al., 2015; de Vries, Kreukels, T'Sjoen, Ålgars, & Mattila, 2015; House of Commons, 2016; Jones et al., 2017). Therefore, gender incongruence may need to be considered by clinicians working at eating disorder services.

Within the cisgender population, several factors (such as body dissatisfaction (e.g., Keel et al., 1997; Stice & Shaw, 2002), high levels of perfectionism (e.g., Egan, Wade, & Shafran, 2011; Tchanturia, Larsson, & Adamson, 2016), the existence of interpersonal problems (e.g., Arcelus, Haslam, Farrow, & Meyer, 2013), low self-esteem (Dakanalis et al., 2016), symptoms of anxiety and depression (e.g., Brechan & Kvalem, 2015; DeBoer & Smits, 2013; Fairburn, Cooper, & Shafran, 2003; Harrison, Sullivan, Tchanturia, & Treasure, 2009; Puccio et al., 2017) have been identified as being associated with eating disorder psychopathology and found to increase the risk of developing an eating disorder. Body dissatisfaction has consistently been found to be associated with eating disorder psychopathology (e.g., Keel et al., 1997; Stice & Shaw, 2002). Dissatisfaction with one's body has been described as a core feature, but not sufficient to completely explain the development of eating disorders (Polivy & Herman, 2002). The relationship between eating disorder psychopathology and body dissatisfaction has been found to be complex as cognitive behavioural and emotional regulation theories of eating disorders have suggested that negative emotions, such as anxiety and depression, as well as self-esteem, mediate the relationship between body dissatisfaction

and eating disorder psychopathology (e.g., Brechan & Kvalem, 2015; DeBoer & Smits, 2013; Fairburn et al., 2003; Harrison et al., 2009). Anxiety symptomatology has also been found to partially mediate the association between self-orientated perfectionism (a trait often associated with eating disorders; Egan et al., 2011) and eating disorder psychopathology (Egan et al., 2013), which suggests that anxiety plays a role in eating disorder development. Furthermore, interpersonal difficulties have also been linked to behaviours associated with eating disorders within the cisgender population (e.g., Arcelus et al., 2013).

Factors associated with, and found to mediate, eating disorder psychopathology in the cisgender population may be particularly pertinent among transgender people. This is because research has consistently shown treatment seeking transgender people to report high levels of mental health problems, such as anxiety and depression (e.g., Arcelus, Claes, Witcomb, Marshall, & Bouman, 2016; Bouman, Davey, Meyer, Witcomb, & Arcelus, 2016a; Bouman et al., 2017a; Dhejne, Van Vlerken, Heylens, & Arcelus, 2016; Millet, Longworth, & Arcelus, 2017), perfectionism (Khoosal et al., 2009), and interpersonal problems (Davey, Bouman, Meyer, & Arcelus, 2015) in comparison to cisgender people. Therefore these factors may be important when exploring risk factors for eating disorder psychopathology within the transgender population.

Once a medical transition has been initiated (e.g., CHT and gender affirming surgery), body dissatisfaction has been found to significantly improve in transgender adults (e.g., de Vries, Steensma, Doreleijers, & Cohen-Kettenis, 2011, de Vries et al., 2014; Fisher et al., 2014; van de Grift et al., 2016, 2017) and, therefore, these interventions may reduce the risk of developing an eating disorder or help to alleviate eating disorder symptoms. Although research is limited (one study date), eating disorder symptoms have been found to reduce

once transgender women progress through their medical transition (Khoosal et al., 2009). However, this study only considered the role of surgery and not CHT. The study is also limited by the small sample size (N=40) and only recruiting transgender women. In light of this, the current study was concerned with exploring the role of CHT only and recruiting a larger sample comprising both men and women. In addition to this, this study was concerned with exploring risk factors in transgender people yet to undergo a medical transition as this vulnerable population may first present to eating disorder services (without disclosing their transgender identity). As the cisgender literature suggests that eating disorders are complex and multifactorial this is also likely to be the case within the transgender population. Variables that can mediate between identified risk factors and eating disorder psychopathology will be explored. These analyses within the transgender population are important to determine through which mechanisms gender affirming medical interventions (e.g., CHT) are capable of alleviating eating disorder symptoms. Taking into consideration some of the limitations of previous research, the study had three specific aims:

1. To examine the role of CHT in eating disorder symptoms by determining whether there is a difference in eating disorder psychopathology (drive for thinness and bulimia) between a large sample of transgender people who are or who are not on CHT.
2. To explore risk factors (age, assigned gender, body dissatisfaction, perfectionism, interpersonal problems, self-esteem, anxiety, and depression) associated with eating disorder psychopathology in transgender people who are not on CHT.
3. To explore factors that mediate the relationship between identified risk factors and eating disorder psychopathology (drive for thinness and bulimia) in transgender people who are not on CHT.

Based on previous research it was first hypothesised that transgender people on CHT would have lower levels of eating disorder psychopathology compared to participants who are not on cross-sex hormones (e.g., Fisher et al., 2014). Second, it was hypothesised that younger age, identifying as female (because transgender people adopt and perform the social gender role (i.e., behaviours, attributes) associated with their experienced gender identity), higher levels of body dissatisfaction, anxiety, depression, perfectionism, interpersonal problems and lower levels of self-esteem would be risk factors for eating disorder psychopathology in transgender people who are not on CHT. Third, based on the centrality of body dissatisfaction to both gender incongruence (e.g., Jones et al., 2016) and eating disorders (e.g., Stice & Shaw, 2002), it was hypothesised that if a significant relationship was found between body dissatisfaction and eating disorder psychopathology (addressed in aim 2), then the other identified risk factors would mediate this relationship in people who are not on CHT.

Method

Participants and recruitment

All patients offered an assessment at a national transgender health service in the United Kingdom (UK) between 2012 and 2015 were invited to take part in the study. This transgender health service offers assessment and gender affirming medical interventions to adults aged 17 and over who are considering, or wish to, medically transition. Patients are assessed by a transgender health professional, which could be a psychiatrist, psychologist or nurse specialist. The assessment process usually occurs over three appointments, with two different clinicians. During the third appointment, patients are invited to bring a relative or friend with them. In total, 586 patients were invited for assessment during the study period and 563 (96%) agreed to participate (see Table 1 for characteristics of the whole sample). While all participants were recruited at the point of assessment, some people had initiated CHT prior to assessment at this service (n=139, 24.7%). Some participants may have initiated this intervention as their care was transferred from the child and adolescent gender identity development service and others might have obtained CHT through private health providers or via the Internet (Mepham, Bouman, Arcelus, Hayter, & Wylie, 2014). Table 1 also presents descriptive statistics separately for people who were and were not on CHT. In order to have an overall representation of patients attending a national transgender health service, no exclusion criteria were applied.

Insert Table 1 here

Procedure

Before initial assessment, participants were invited to complete socio-demographic questions and a range of self-report measures. This was part of a larger study for which ethical approval was obtained from the National Health Service (NHS) ethics committee and from the

Research and Development Department from the Nottinghamshire Healthcare NHS Foundation Trust in accordance with Health Research Authority guidance (HRA, 2013). Patients were informed that they could request a summary of the research findings on completion of the project. No patients chose to do this.

Measures

Socio-demographic information: Participants were asked to provide information about their age, gender assigned at birth, and stage of medical transition pre-assessment (e.g., whether they were on CHT or not). They were then invited to complete the following selection of self-report measures.

Eating Disorder Inventory-2 (EDI-2; Garner, 1991)

This questionnaire is commonly used to assess behaviours and psychological traits associated with eating disorder psychopathology. It has 11 subscales; three which assess eating-related symptoms (drive for thinness, bulimia, and body dissatisfaction) and eight which are associated with eating-related psychological features common in eating disorders (ineffectiveness, perfectionism, interpersonal distrust, interoceptive awareness, maturity fears, asceticism, impulse regulation, and social insecurity). In the current study, the drive for thinness and bulimia subscales were used to measure eating disorder psychopathology. The body dissatisfaction, perfectionism and interpersonal distrust subscales were also used. Responses are rated on a 6-point Likert scale anchored from '*never'* to '*always'* and a higher score indicates a higher level of eating disorder psychopathology. All the subscales have previously been found to have good reliability among patients with an eating disorder and the general population (e.g., Nevonen, Clinton, & Norring, 2006). In the current study, the Cronbach alpha values were as follows: drive for thinness (α=.85), bulimia (α=.83), body

dissatisfaction (α=.85), perfectionism (α=.70) and interpersonal distrust (α=.80), showing that all had good reliability.

Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965)

This is a 10-item self-report measure that assesses self-esteem using a 4-point Likert scale (‘*strongly agree’* = 3 to ‘*strongly disagree’* = 0). It produces a global score, which is calculated by summing the scores from the individual items. A high score indicates a higher self-esteem (highest possible score is 30). The measure has been validated and has excellent reliability (α=0.88-0.90; Robins, Hendin, & Trzesniewski, 2001). In the current study, the reliability was also excellent (α=.92).

Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983)

This measure has 14 items in total, seven which relate to anxiety (HADS-A) and seven which relate to depression (HADS-D). The HADS-A and HADS-D subscale scores are calculated by summing scores from the individual items. Participants are asked to rate their responses on a 4-point Likert Scale (‘*not at all’* = 1 to ‘*most of the time’* = 3). For each subscale, scores between 0-7 are considered normal, scores between 8-10 are considered borderline clinical, and scores of 11 and above are considered clinically relevant (Snaith, 2003). The highest score possible is 21 for each subscale. The measure has good reliability in somatic, psychiatric and primary care patients as well as in the general population (Bjelland, Dahl, Haug, & Neckelmann, 2002). In the current study, both the anxiety (α=.84) and depression (α=.77) subscales had good reliability.

Data analysis

Data were analysed using SPSS 23 (IBM, 2015). The data were not normally distributed and therefore non-parametric tests were used when possible. Missing data were excluded using the pairwise method apart from in the Mann-Whitney U analysis where the test-by-test method was employed. Before the main analysis, descriptive analysis was conducted. For the first aim, a Mann-Whitney U test was conducted to determine whether there was a difference in eating disorder psychopathology between people who had taken CHT and those who had not. For the second aim, preliminary one-tailed Spearman Rho correlations were conducted between the dependent variables (drive for thinness and bulimia) and independent variables (age, gender assigned at birth, anxiety, depression, self-esteem, body dissatisfaction, interpersonal distrust and perfectionism). As categorical variables cannot be entered into correlational analysis, a dummy variable was created for gender assigned at birth. The function of the Spearman's Rho correlations was to determine which variables significantly correlated with the dependent variables and, consequently, to include only these variables in subsequent regression analysis to increase its robustness. Multicollinearity was not a cause for concern as no variable correlated at $r \geq .90$ with the outcome variables (Pallant, 2010). As multiple comparisons were conducted, Bonferroni corrections were used for the correlation analysis ($.05 \div 16 = .003$). To determine which variables were able to explain the most variance in eating disorder psychopathology (drive for thinness and bulimia) in people who were yet to take CHT, stepwise multiple linear regression analysis was conducted. Once the risk factors had been established an ANCOVA was conducted to determine whether there was a significant difference in eating disorder symptoms between people who were and were not on CHT after controlling for the risk factors identified in the multiple linear regression analysis. For the third aim, mediation analysis was conducted to better understand the mechanisms that underlie the relationship between the independent variable (hypothesised to be body dissatisfaction) and eating disorder psychopathology (drive for thinness and

bulimia). Mediation analysis was conducted using the PROCESS macro in SPSS (Hayes, 2013). Model 4, which uses the bias-corrected bootstrap confidence interval method, was employed. The level of significance used for all the analysis was $p<.05$.

Results

Aim 1: Differences in eating disorder psychopathology between people who were on cross-sex hormones and those who were not

A Mann-Whitney U test was conducted to determine whether participants who were (n=139) and were not (n=416) on CHT differed in levels of drive for thinness and bulimia. The analysis demonstrated that transgender people who were not on CHT reported significantly higher levels of drive for thinness and bulimia compared to participants who were on CHT (see Table 2).

Mann-Whitney U tests also showed that people who were not on CHT were significantly younger, had higher levels of body dissatisfaction and interpersonal distrust, more symptoms of anxiety and depression, and lower levels of self-esteem than participants who were on CHT (see Table 2). There was no significant difference in levels of perfectionism between the two groups. A Pearson Chi-Squared test was conducted to explore differences in gender assigned at birth based on CHT use and this test was not significant (χ^2 (1) =3.01, p=.083) suggesting that gender assigned at birth is independent of CHT.

Insert Table 2 here

Aim 2: Risk factors of eating disorder psychopathology in people who were <u>not</u> on CHT

Drive for thinness: Body dissatisfaction, high levels of perfectionism, the experience of interpersonal distrust, symptoms of anxiety and depression and low self-esteem were all significantly correlated with drive for thinness in people who were not on CHT (n=416; see Table 3) and were therefore entered into the subsequent stepwise regression analysis.

Insert Table 3 here

Overall, the stepwise regression model was significant and the significant variables explained 30% of the total variance of drive for thinness (see Table 4). Higher levels of body dissatisfaction made the largest contribution to the variance followed by high levels of perfectionism and anxiety symptoms (see Table 4). The average VIF (variance inflation factor) for this model was 1.10 and the average tolerance was 0.91. The average VIF was not greater than 10 (Myers, 1990) and the average tolerance was not below 0.10 (Menard, 1995), which indicates that the assumptions of multicollinearity for this model were met and hence the variables were not too highly correlated.

Bulimia: Body dissatisfaction, high levels of perfectionism, the experience of interpersonal distrust, symptoms of anxiety and depression and low self-esteem were all significantly correlated with bulimia in people who were not on cross-sex hormones (n=416; see Table 3). These six variables were therefore entered into a subsequent stepwise regression model. Overall, this model was significant and explained 25% of the total variance in bulimia (see Table 4). Low self-esteem made the largest contribution to the variance, followed by high levels of perfectionism, body dissatisfaction and symptoms of anxiety (see Table 4). The average VIF for this model was 1.38 and the average tolerance was 0.75 indicating that there is no multicollinearity within the model (Menard, 1995; Myers, 1990).

Insert Table 4 here

After determining the risk factors for eating disorder psychopathology in people yet to commence cross-sex hormones (n=416), an ANCOVA was conducted to determine whether there was a significant difference in eating disorder psychopathology between people who

were (n=139) and were not (n=416) on CHT, after controlling for the identified risk factors. It was found that there was no longer a significant difference in drive for thinness between people who were and were not on CHT when body dissatisfaction, perfectionism and symptoms of anxiety were controlled for ($F(1, 538) = .35$, $p=.885$). It was also found that there was no longer a significant difference in levels of bulimia between people who were and were not on cross-sex hormones after self-esteem, perfectionism, body dissatisfaction and symptoms of anxiety were controlled for ($F(1, 529) =.03$, $p=.868$).

Aim 3: Exploring the mediators of the relationship between risk factors and eating disorder psychopathology in people who were <u>not</u> on CHT

In addressing aim 2, it was found that high levels of body dissatisfaction were a risk factor for both drive for thinness and bulimia. Due to the centrality of body dissatisfaction in both gender incongruence (e.g., Jones et al., 2016, van de Grift et al., 2016, 2017) and eating disorders (e.g., Stice & Shaw, 2002), mediators of the relationship between body dissatisfaction and eating disorder psychopathology were explored for people who had not yet commenced CHT (n=416). The remaining risk factors identified in aim 2 were explored as mediators (perfectionism, symptoms of anxiety and self-esteem). Mediation occurs when the bootstrapped lower and upper confidence intervals do not include zero.

Perfectionism (model 1) and symptoms of anxiety (model 2) were explored separately as mediators of the relationship between body dissatisfaction and drive for thinness. Self-esteem (model 3), perfectionism (model 4) and anxiety (model 5) were explored separately as mediators of the relationship between body dissatisfaction and bulimia. Figure 1 demonstrates the five different models analysed through the direct and indirect effects. As can be seen by the unstandardized beta model coefficients (*a*, *b*, *c*) in Table 5, X (the

independent variable; body dissatisfaction) always significantly predicted M (the mediator) depicted by pathway (*a*), and M always significantly predicted Y (the outcome variable; drives for thinness or bulimia) depicted by pathway (*b*), in all five models analysed. The direct effect (X-Y; depicted by pathway *c*) was also significant in all models (see Table 5). For the indirect effect, a bias-corrected bootstrap confidence interval based on 5000 bootstrap sample was explored. As the bootstrapped lower and upper confidence intervals did not include zero it can be concluded that perfectionism (model 1) and symptoms of anxiety (model 2) each significantly mediated the relationship between body dissatisfaction and drive for thinness. This indicates that the relationship between body dissatisfaction and drive for thinness can be explained by the presence of perfectionism and anxiety symptoms. In addition, self-esteem (model 3), perfectionism (model 4) and symptoms of anxiety (model 5) each mediated the relationship between body dissatisfaction and bulimia (see Table 5). This indicates that the relationship between body dissatisfaction and bulimia can be explained by the low self-esteem, perfectionism and anxiety symptoms.

Insert Figure 1 and Table 5 here

Discussion

This study aimed to understand the risk factors for eating disorder psychopathology within the transgender population, as well as the role of CHT in eating disorder psychopathology. The current study found that transgender people who were on CHT had significantly lower levels of eating disorder symptoms than transgender people who were not. When comparing this finding to previous literature, people within the current study who were on CHT presented with similar levels of eating disorder psychopathology compared to the general population (Witcomb et al., 2015). In contrast, transgender people in the current study who were not on CHT presented with higher levels of eating psychopathology than is found within the general population (Witcomb et al., 2015). When the current study's finding and previous research are considered together, it suggests that CHT may be able to alleviate eating disorder psychopathology, which is in keeping with previous research (Fisher et al., 2014; Khoosal et al., 2009) and case studies (Couturier et al., 2015; Winston et al., 2004) that have supported the notion that eating disorder psychopathology in transgender people is secondary to gender incongruence.

This study is novel in that it aimed to understand *why* CHT might alleviate eating disorder symptoms by exploring risk factors in transgender people yet to undergo a medical transition. The current study found that high levels of body dissatisfaction, perfectionism, symptoms of anxiety, and low self-esteem were all risk factors for eating disorder psychopathology as reported in the cisgender literature (e.g., Brechan & Kvalem, 2013; Dakanalis et al., 2016; Egan et al., 2011; Fairburn et al., 2003; Keel et al., 1997; Puccio et al., 2017; Tchanturia et al., 2016). Once the identified risk factors for eating disorder psychopathology were controlled for, there was no longer a significant difference in eating disorder symptoms between people who were and were not on CHT. This finding suggests that CHT alleviates

eating disorder symptoms as it reduces levels of body dissatisfaction, perfectionism, symptoms of anxiety and increases self-esteem.

Within the cisgender literature, body dissatisfaction has been described as a core feature of – though not sufficient to adequately explain - eating disorder symptoms (Polivy & Herman, 2002) and, consequently, other factors have been found to mediate the relationship between body dissatisfaction and eating disorder psychopathology (e.g., Brechan & Kvalem, 2015; DeBoer & Smits, 2013; Fairburn et al., 2003; Harrison et al., 2009). This also appears to be the case within the transgender population as the current study found high levels of perfectionism and symptoms of anxiety to mediate the relationship between body dissatisfaction and drive for thinness. Additionally, low self-esteem, high levels of perfectionism and symptoms of anxiety were found to mediate the relationship between body dissatisfaction and bulimia in transgender individuals. These findings help to clarify the mechanisms through which CHT might be able to alleviate eating disorder symptoms. They suggest that CHT primarily alleviates high body dissatisfaction, which in turn reduces levels of perfectionism and symptoms of anxiety, and increases self-esteem. In combination, these factors then appear to alleviate eating disorder symptoms. This is the first study with transgender people that has been able to indicate *how* cross-sex hormones alleviate eating disorder symptoms, although this finding needs to be replicated with longitudinal research.

Clinicians working in eating disorder services should routinely assess gender identity issues as this is where transgender people may first present due to experiencing high levels of body dissatisfaction and eating disorder symptoms that are secondary to gender incongruence. Such patients should be referred to transgender health services as this study has shown the positive role that CHT plays in eating disorder symptoms. CHT is likely to be more effective

than interventions offered at eating disorder services in these circumstances (Ewan, Middleman, & Feldmann, 2014). However, there are likely to be a small number of patients that also require eating-related interventions. To determine whether this is suitable, the role of eating disorder psychopathology will need to be assessed. In our clinical experience, the presence of eating disorder psychopathology, such as food restriction, is engaged in to stop the development of secondary sex characteristics that are related to the individual's assigned gender, such as breast development or menstruation. However, in some cases, CHT alone may not be enough to reduce eating disorder psychopathology and clinicians at transgender health and eating disorder services may need to work together to alleviate eating disorder psychopathology whilst also facilitating access to gender affirming medical interventions.

When patients are referred to transgender health services with symptoms of eating disorders, clinicians might be reluctant to accept such patients onto the treatment programme until these issues are resolved. The findings of the current study indicate that for patients presenting with high levels of eating disorder symptoms (that are secondary to gender identity issues), timely initiation of CHT may likely reduce these symptoms, as well as their gender incongruence. Given the existence of significant barriers to accessing transgender health care (Bouman & Richards, 2013; Jones et al., 2017; Kanamori & Cornelius-White, 2016; Scheim, Zong, Giblon, & Bauer, 2017), it is imperative that access to these services is increased to minimise the risk of eating disorder psychopathology. In addition, although gender affirming medical interventions alleviate body dissatisfaction (a core feature of eating disorder psychopathology) for many, patients who report very high body dissatisfaction pre-gender affirming medical interventions have been found to continue to do so post-gender affirming medical interventions (van de Grift et al., 2017). Clinicians at transgender health services must consider that these patients (who report high body dissatisfaction post-gender affirming

interventions) may be vulnerable to eating disorder psychopathology and therefore may require eating-related interventions.

Within the current study, neither age or gender (assigned at birth) were found to be risk factors for eating disorder psychopathology within treatment seeking transgender people who were yet to commence CHT. This contrasts with research within the cisgender population which has found adolescents and young adult females to be at greater risk than males and older people (e.g., Fairburn & Harrison, 2003; Zeiler et al., 2016) and was despite the current study finding that people who were yet to commence CHT were significantly younger (and reported more eating disorder symptoms) than people who had initiated CHT. Previous research with transgender people has found transgender men (assigned female at birth) to report very high levels of body dissatisfaction (a common feature of eating disorder psychopathology) that were comparable to cisgender men with an eating disorder (Witcomb et al., 2015). This finding was not replicated when transgender women were compared to cisgender women with an eating disorder (Witcomb et al., 2015). Therefore, although gender may not be a risk factor for eating disorder symptoms within the transgender population, clinicians in both eating disorder and transgender health services should be mindful that levels of body dissatisfaction among people assigned female at birth may mean that the prevalence of eating disorder symptoms is higher than in people assigned male at birth.

For the first time, the current study has identified multiple risk factors for eating disorder psychopathology within a large sample of treatment seeking transgender people. In addition to this, the alleviating role that CHT plays in eating disorder symptoms has been recognised. This is in contrast to previous research, which has found levels of eating disorder symptoms in the transgender population to be higher than in the general population without

understanding why (Witcomb et al., 2015). However, the following limitations should be considered. First, this study is cross-sectional and therefore causality cannot be determined. Risk factors need to be explored with further longitudinal research. Second, the group sizes within the comparative analysis were different which might have impacted on the findings. Finally, analysis was conducted in relation to gender assigned at birth. The majority of transgender people will transition within the binary gender system (i.e., man or woman) but there are increasing numbers of transgender people who identify outside the binary gender system (i.e., gender neutral, non-gender, bigender, third gender) or are fluid with their gender identity (Arcelus & Bouman, 2017a). Therefore, future research should be concerned with transgender people who identify as a woman, a man, and outside the binary gender system.

In conclusion, transgender people who were not on CHT reported more eating disorder symptoms than transgender people who were on CHT. The findings suggest that CHT may be able to alleviate eating disorder symptoms primarily through positively impacting on body dissatisfaction (i.e., increasing body satisfaction) which, in turn, reduces levels of perfectionism and symptoms of anxiety and increases self-esteem. Clinicians working at eating disorder services should incorporate the assessment of gender identity issues within their clinical practice and refer patients with such issues to transgender health services so that they can be evaluated for CHT.

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Table 1: Socio-demographic characteristics for the whole sample, for participants who have taken cross-sex hormones, and for participants who have not taken cross-sex hormones

	Total sample (N=563)	CHT (excluding blockers only†) (n=139)	No CHT (n=416)
	Sample size (%)		
Mean (*SD*) age	29.49 (13.67)	35.37 (16.02)	27.46 (12.15)
Gender assigned at birth			
Female	211 (37.5)	44 (31.7)	166 (39.9)
Male	352 (62.5)	95 (68.3)	250 (60.1)
Cross-sex hormones			
Yes (excluding blockers only)	139 (24.7)		
No	416 (73.9)		
No response	8 (1.4)		
Blockers only (no CHT)			17 (4.1)

Note: CHT (cross-sex hormone treatment); †People who had only taken blockers (and not CHT) were excluded from the cross-sex hormones group as in contrast to CHT; hormone blockers do not affect secondary sex characteristics. Based on this, these people were included within the no cross-sex hormone group.

Table 2: Means, standard deviations (SD) and Mann Whitney U tests of difference between people who have taken CHT and those who have not for all study variables

	No CHT (n=416)	CHT (n=139)	Mann-Whitney U		
	M (*SD*)	M (*SD*)	U	Z	*p*
Age	27.46 (12.15)	35.37 (16.02)	20126.50	-5.38	.001
Drive for thinness	3.87 (4.95)	2.82 (4.07)	25207.50	-2.14	.019
Bulimia	1.87 (3.54)	0.96 (2.32)	24178.00	-2.99	.002
Body dissatisfaction	12.13 (6.96)	9.62 (6.83)	22368.00	-3.86	.001
Interpersonal distrust	5.66 (4.60)	3.56 (3.86)	20609.50	-4.72	.001
Anxiety	8.27 (4.31)	6.45 (4.00)	21021.50	-4.39	.001
Depression	7.22 (3.88)	5.18 (3.48)	19270.50	-5.37	.001
Self-esteem	14.74 (6.52)	19.01 (6.49)	17849.00	-6.31	.001
Perfectionism	5.10 (4.19)	4.88 (3.86)	27975.50	-.28	.410

CHT (cross-sex hormone treatment)

Table 3: One-tailed Spearman's Rho correlations between drive for thinness, bulimia and the study variables for people who have not taken CHT (n=416)

	Drive for thinness	Bulimia
Age	.01	-.12
Male gender assigned at birth†	-.05	-.07
Female gender assigned at birth†	.05	.07
Body dissatisfaction	.48***	.31***
Perfectionism	.24***	.26***
Interpersonal distrust	.27***	.30***
Anxiety	.35***	.36***
Depression	.30***	.28***
Self-esteem	-.37***	-.48***

*p<0.05, **p<0.01, ***p<0.001 (corrected for multiple comparisons); † entered as dummy variables

CHT (cross-sex hormone treatment)

Table 4: Stepwise regression models showing the significant risk factors of (i) drive for thinness and (ii) bulimia for people who have not taken CHT (n=416)

	F	R^2	*beta*	SE *beta*	β
Drive for thinness	57.32***	.30			
Body dissatisfaction			.31	.03	.43***
Perfectionism			.18	.05	.16***
Anxiety			.18	.05	.16***
Bulimia	32.86***	.25			
Self-esteem			-.13	.03	-.24***
Perfectionism			.15	.04	.18***
Body dissatisfaction			.08	.02	.16***
Anxiety			.12	.05	.14**

*p<0.05, **p<0.01, ***p<0.001

CHT (cross-sex hormone treatment)

Table 5: Perfectionism, self-esteem and anxiety as potential mediators of the relationship between body dissatisfaction and eating disorder psychopathology (drive for thinness and bulimia) in people who have not taken CHT (n=416)

	Regression model unstandardized beta coefficients for paths *a, b, c* and *ab* and bootstrapped lower and upper confidence intervals					
Outcome variable	**Mediator in model**	***a* (*beta*) (X-M)**	***b* (*beta*) (M-Y)**	***c* (*beta*) (X-Y; direct effect)**	***ab* (*beta*) (indirect effect)**	**Bootstrap lower CI**	**Bootstrap upper CI**
Drive for thinness							
	Model 1: Perfectionism	.09**	.23***	.33***	.02	.01	.04
	Model 2: Anxiety	.15***	.23***	.31***	.03	.02	.06
Bulimia							
	Model 3: Self-esteem	-.39***	-.19***	.10**	.07	.05	.10
	Model 4: Perfectionism	.09***	.29***	.14***	.02	.01	.04
	Model 5: Anxiety	.15***	.25***	.12***	.04	.02	.06

*p<0.05, **p<0.01, ***p<0.001, X-body dissatisfaction, M-mediator variable (perfectionism, self-esteem and anxiety), Y-outcome variable (drive for thinness or bulimia). CHT (cross-sex hormone treatment)

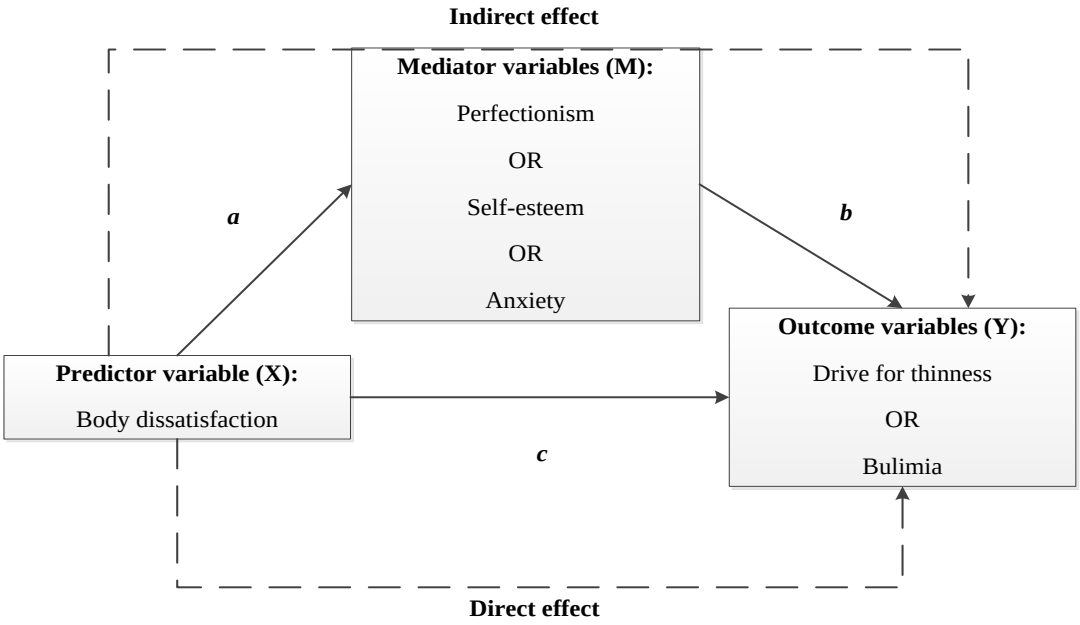


Figure 1: Mediation analyses for perfectionism and anxiety as mediators between body dissatisfaction and drive for thinness and, for self-esteem, perfectionism and anxiety as mediators between body dissatisfaction and bulimia