

## Gender Dysphoria and Autism Spectrum Disorder: A Systematic Review of the Literature



Derek Glidden, MD,<sup>1</sup> Walter Pierre Bouman, MD, FRCPsych,<sup>1</sup> Bethany A. Jones, MSc,<sup>1,2</sup> and Jon Arcelus, MD, PhD<sup>1,3</sup>

### ABSTRACT

**Introduction:** There is a growing clinical recognition that a significant proportion of patients with gender dysphoria have concurrent autism spectrum disorder (ASD).

**Aim:** The purpose of this review is to systematically appraise the current literature regarding the co-occurrence of gender dysphoria and ASD.

**Methods:** A systematic literature search using Medline and PubMed, PsycINFO, and Embase was conducted from 1966 to July 2015.

**Main Outcome Measures:** Fifty-eight articles were generated from the search. Nineteen of these publications met the inclusion criteria.

**Results:** The literature investigating ASD in children and adolescents with gender dysphoria showed a higher prevalence rate of ASD compared with the general population. There is a limited amount of research in adults. Only one study showed that adults attending services for gender dysphoria had increased ASD scores. Another study showed a larger proportion of adults with atypical gender identity and ASD.

**Conclusion:** Although the research is limited, especially for adults, there is an increasing amount of evidence that suggests a co-occurrence between gender dysphoria and ASD. Further research is vital for educational and clinical purposes.

*Sex Med Rev* 2016;4:3–14. Copyright © 2016, International Society for Sexual Medicine. Published by Elsevier Inc. All rights reserved.

**Key Words:** Gender Dysphoria; Transgender; Transsexualism; Autism; Autism Spectrum Disorder; Systematic Review

### INTRODUCTION

*Gender dysphoria*, a diagnostic term from the *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5)*,<sup>1</sup> is used to define individuals presenting with an incongruence between assigned and experienced gender. The diagnosis is characterized by a strong and persistent cross-gender identification, which is often associated with significant distress of one's own biological sexual characteristics and assigned social gender role. The *International Classification of Diseases, 10th Edition (ICD-10*; World Health Organization, 1992) describes the desire to live and be accepted as a member of the opposite sex as transsexualism. Sometimes this

gender incongruence is sufficiently intense that people undergo a transition to the opposite gender (usually from male to female or from female to male). This typically involves changes in social role and presentation and might require the prescription of cross-sex hormones or having gender-related surgeries.<sup>2–4</sup>

There are several different terms used in the literature to describe people who feel incongruence between their assigned sex at birth and gender identity; however, throughout this review, the terms *transfemale* is used to describe individuals assigned male at birth, based on their genital appearance, but who later identify as female, and *transmale* for people assigned female at birth, based on their genital appearance, but who later identify as male.

Studies assessing prevalence rates of gender dysphoria in the general population are complex to undertake and most studies have examined trans people attending gender identity clinical services. Because most of these studies have been conducted in Europe, they have adopted the *ICD-10* diagnostic term of *transsexualism*<sup>5,6</sup> or previous diagnostic terms such as *gender identity disorder* (GID) according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision*

Received June 12, 2015. Accepted October 1, 2015.

<sup>1</sup>Nottingham Centre for Gender Dysphoria, Nottingham, United Kingdom;

<sup>2</sup>School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough, Leicestershire, United Kingdom;

<sup>3</sup>Division of Psychiatry and Applied Psychology, Faculty of Medicine and Health Sciences, University of Nottingham, Nottingham, United Kingdom  
Copyright © 2016, International Society for Sexual Medicine. Published by Elsevier Inc. All rights reserved.

<http://dx.doi.org/10.1016/j.sxmr.2015.10.003>

(*DSM-IV-TR*).<sup>7</sup> The prevalence rates quoted in these studies have varied from 0.45<sup>8</sup> to 23.6<sup>9</sup> per 100,000 people. More recent prevalence rates of 1:10,000 to 1:20,000 for men and 1:30,000 to 1:50,000 for women have been reported.<sup>10</sup> In addition, another recent study calculated an overall meta-analytical prevalence for transsexualism of 4.6 in 100,000 people (6.8 for transwomen and 2.6 for transmen).<sup>11</sup> Prevalence studies using the new *DSM-5* diagnostic term of *gender dysphoria* are not currently available.

Within clinical services, there has been an increasing number of trans people also presenting with autism spectrum disorder (ASD), which has been of great clinical interest because it has implications for diagnosis and treatment.<sup>12,13</sup> *Autism spectrum disorder* is defined in the *DSM-5* as persistent deficits in social communication and social interaction across multiple contexts. These disturbances must not be better explained by intellectual disability (intellectual developmental disorder) or global developmental delay. Autism spectrum disorder has a prevalence of 20.6:10,000 with a male-to-female ratio of 4.2 to 1,<sup>14</sup> although a recent report has suggested that rates could be as high as 1 in 50 for men and 1 in 150 for women.<sup>15</sup>

Researchers investigating rates of ASD in trans people attending services have found that up to 7.8% report a lifetime prevalence of ASD.<sup>12</sup> However, these findings are contradictory to more recent studies that have shown no differences between trans people and the general population in relation to ASD.<sup>16</sup> The disparity of these findings can be explained by the population selected (adult vs. child), recruitment process (clinics vs population studies), diagnostic classification system used (*DSM* vs *ICD*), methodology, design of study (case reports, cohort studies, etc.), and tools selected to assess the diagnoses.

Currently, there have been three reviews of the literature pertaining to gender identity, ASD, and their co-occurrence. Two of these articles were nonsystematic reviews of the literature<sup>17,18</sup> and one was a systematic review.<sup>19</sup> Van Schalkwyk et al<sup>18</sup> simply reviewed the literature for ASD and gender dysphoria and concluded that owing to the limited quantitative research and the conceptual challenge of gender identity, it was impossible to draw any conclusion about the co-occurrence between ASD and gender dysphoria and its etiology. Robinow,<sup>17</sup> who also completed a nonsystemic review, set out to explore the etiology of ASD, transgenderism, and paraphilias. He concluded that this co-occurrence could be accounted for by the relationship and neurobiology between parent and child. These results should be viewed with caution owing to the lack of robust evidence underpinning the conclusions. In contrast, Wood and Halder<sup>19</sup> conducted a systematic review to explore the literature pertaining to gender disorders and learning disabilities. Gender disorders included GID, transsexualism, cross-dressing, transvestism, and gender-related sexual disorders. The diagnostic characteristics of GID greatly differ from those of cross-dressing and transvestism. Moreover, treatment and management of these conditions are vastly different. The investigators commented on

how there was a dearth of guidance on appropriate treatment and management.

To the authors' knowledge, there is no current and robust systematic review of the literature pertaining to ASD in trans people. It was therefore the aim of this review to fill this gap within the literature. It is hoped that by obtaining an in-depth and critical overview of the literature, this will aid clinicians when working with trans people with ASD.

## METHODS

### Search Strategy

This systematic review adheres to the guidelines detailed in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.<sup>20</sup> The following databases were searched from 1966 to July 2015: Medline and PubMed, PsycINFO, and Embase. Four full-text collections were searched: ScienceDirect, Ingenta Select, Ovid Full Text, and Wiley-Blackwell Interscience. Search terms for trans people (*transsexualism, transgender, gender dysphoria, gender identity disorder*) and for ASD (*autistic/autism spectrum disorder, Asperger syndrome, autism and high functioning autism*) were combined using the "OR" and "AND" operators. Studies of interest were those that included empirical data on the rates of ASD in trans people or the rates of gender dysphoria in people with a diagnosis of ASD. Literature pertaining to treatment options and outcomes of trans people with ASD were included. A second researcher (J.A.) also completed an independent literature search using the same method to increase the validity of the search.

### Eligibility Criteria

Studies selected included correlational studies exploring the association between ASD and trans people. Case studies were included, but literature reviews were excluded. Participants had to have a *DSM* or *ICD* diagnosis of ASD or gender dysphoria. If an official diagnosis of gender dysphoria or ASD was not obtained, then a recognized and validated tool for ASD or gender dysphoria must have been used. Articles that were considered eligible were written in English and were published in print. Articles in gray literature (including dissertations) or non-peer-reviewed journals were excluded.

### Study Selection and Data Collection Process

Articles were screened in three stages: title, abstract, and full text. In the first instance, articles were screened by title ( $n = 58$ ) and duplicates were removed ( $n = 0$ ). Then, all articles were reviewed by abstract for relevance and excluded at this stage if not fulfilling the inclusion criteria. The remaining articles ( $n = 21$ ) were downloaded for full text review and the reference lists of these articles were systematically explored. At this stage, two literature reviews of previous studies in trans people and ASD<sup>17,18</sup> were identified and excluded in accordance to the

inclusion criteria. The final sample consisted of 19 studies meeting all eligibility criteria.

There were two outcome measurements of interest: (i) prevalence of ASD in trans people and (ii) prevalence of gender dysphoria in people with ASD. The [Results](#) section presents a review of the available literature exploring treatment options and outcomes of trans people and ASD. The articles were divided into peer-reviewed cross-sectional studies and case series or case studies.

## RESULTS

### Study Characteristics

Nineteen relevant studies published from 1966 to July 2015 investigating or describing the relation between trans people and ASD were considered in this systematic review. Of the 19 articles, 8 were case reports<sup>13,21–27</sup> and 4 were cohort studies. The first cohort study explored the development of gender identity in children with autism,<sup>28</sup> the second established the co-occurrence of ASD and gender dysphoria,<sup>12</sup> the third attempted to establish predictive factors for autism spectrum traits,<sup>29</sup> and the fourth reviewed the overrepresentation of adolescent developmental problems in minors with gender dysphoria.<sup>30</sup> Six studies considered within this systematic review were case–control studies, two of which used the Autistic Quotient (AQ) to compare autism spectrum traits within a sample of patients with gender dysphoria and a control group.<sup>16,31</sup> A third study investigated sex and gender role orientation in a sample of people with ASD against a matched control group.<sup>32</sup> A fourth study interviewed parents of children presenting with gender dysphoria<sup>33</sup> using the Social Responsiveness Scale (SRS)<sup>34</sup> to compare autism spectrum traits between a sample of children with gender dysphoria and a control group. A fifth study recruited parents of adolescents with gender dysphoria attending services and asked them to complete the Systemizing Quotient (SQ) and the Empathy Quotient (EQ).<sup>35</sup> The remaining study investigated the rate of obsessional interest and compulsive behavior using questions from the Child Behavior Checklist (CBCL).<sup>36</sup> Of the 19 studies eligible for this systematic review, one was a chart review, which explored rates of gender incongruence as reported by parents on the CBCL in children with different neurodevelopmental disorders, including ASD.<sup>37</sup> All studies used clinical samples. The results are reported for studies involving children and adults separately, in chronologic order of publication, to highlight the evolution of the thinking and understanding in the field.

### Publications on Children and Adolescents

Of the 19 studies, 12 were concerned with children and adolescents. A summary of all the studies is presented in [Tables 1](#) and [2](#). Abelson<sup>28</sup> published the first study on the development of gender identity in children with autism. Gender identity was assessed through the Michigan Gender Identity Test (MGIT)<sup>38</sup> in 30 children who had a clinical diagnosis of autism. The MGIT asks children to sort out photos of boys and girls wearing

gender-appropriate clothing into categories of boys and girls. The children also are asked to categorize themselves. The study found a significant positive correlation between increasing mental age and the ability to successfully perform the MGIT and, to a lesser degree, increasing chronologic age. A significant positive relation also was shown between the MGIT and the Gesell Question (“Are you a little boy or a little girl?”).<sup>39</sup> Interestingly, three children were unable to answer the Gesell Question while correctly completing the MGIT. This indicates that they were able to identify gender in others, but not in themselves. Although the sample was small, it was the first study to highlight the relation between gender identity and ASD.

In 2010, De Vries et al<sup>12</sup> undertook a cohort trial to determine the co-occurrence of GID, as defined in the *ICD-10*,<sup>5</sup> and ASD, according to the *DSM-IV-TR*.<sup>7</sup> The sample was comprised of children (n = 108) and adolescents (n = 96) who were referred to a national gender identity clinic in the Netherlands and were clinically diagnosed with GID by a senior clinician. The study found that the prevalence of ASD in children with GID was 1.9% (n = 1) and 13% (n = 6) for those with GID not otherwise specified (NOS; disorders of gender identity that are not classifiable as a specific GID).<sup>7</sup> Interestingly, in six of the children, their gender dysphoria alleviated at 1-year follow-up, which is fitting with previously published data.<sup>40–42</sup> The study also found that the prevalence of ASD in all assessed adolescents was 9.4% (n = 9), 6.5% in those with GID (n = 5), and 37.5% (n = 3) for those with GID NOS. The study concluded that the combined prevalence of ASD within the combined sample was 7.8% (n = 16), 4.7% (n = 6) in those with GID, and 17.0% (n = 9) in GID NOS. This is significantly higher than the prevalence of ASD in the general population as previously reported.<sup>15,43</sup> De Vries et al<sup>12</sup> used a well-validated diagnostic tool for ASD, the Diagnostic Interview for Social and Communication Disorder.<sup>44</sup> However, patients were selected for further examination with the Diagnostic Interview for Social and Communication Disorder only if the clinician suspected a diagnosis; therefore, possible cases could have been missed by the researchers.

Some researchers have examined specific psychological functions that are characteristic of ASD. For instance, Di Ceglie et al<sup>35</sup> set out to explore systemizing and empathizing (two psychological constructs related to ASD) in adolescents with gender dysphoria attending their clinical service. They asked parents of the trans adolescents and of a cis (non-trans) control group to complete the adolescent EQ and SQ. They found that the mean EQ score of trans-girls and trans-boys was significantly lower than that of control cis girls but similar to that of control cis boys. With regard to the SQ, there was no difference between the trans participants and controls. The study is limited by the small sample (n = 35) and poor sampling methods (ie, trans people were recruited from only one clinical service), which makes the study non-generalizable.

Most of the literature is concerned with the presence of ASD among referrals at a gender identity clinic, so Strang et al<sup>37</sup> set out

**Table 1.** Study Characteristics in Children and Adolescents

Date	Author	Type of study	Patients, n	Recruitment	Diagnostic or screening tools	Results
1981	Abelson	Cohort	30	Patients with previously established ASD	MGIT, Alpern-Boll Developmental Profile, Gesell Question	Positive correlation between mental age and successful MGIT; positive correlation between MGIT and Gesell Question
2010	De Vries et al	Cohort	231	Children and adolescents referred to gender identity clinic service	Gender dysphoria: clinical assessment via <i>DSM-IV-TR</i> and <i>ICD-10</i> diagnostic criteria; ASD: initial clinician screening for cases; DISCO-10	Incidence of 7.8% of ASD in total study; incidence of 4.7% of ASD with gender dysphoria; incidence of 17% of ASD with gender dysphoria NOS
2014	Di Ceglie et al	Case–control	347	Parents of adolescents who were diagnosed with gender dysphoria or a control group without gender dysphoria	Gender dysphoria: clinical assessment via <i>DSM-IV</i> criteria; ASD: EQ and SQ	Mean EQ score of trans-boys and trans-girls was significantly lower than control girls but similar to control boys; mean score on the SQ did not differ between trans participants and controls
2014	Strang et al	Case note review	554	Children and adolescents diagnosed with ASD, ADHD, a neurodevelopment disorder, and controls (with none of the above disorders) and normative data from the CBCL	Gender dysphoria: CBCL; ASD: ADI/ADI-R, ADOS	Incidence of 5.4% of gender variance in ASD; incidence of 4.8% of gender variance in ADHD; incidence of 1.7% of gender variance in neurodevelopment group; incidence of 0.07% of gender variance in controls
2014	VanderLaan et al	Cohort	49	Children with gender dysphoria at gender identity clinic service	SRS, GIQC, Wechsler Intelligence Scale for Children, CBCL	High birth weight predicted increased ASD traits; increased gender nonconformity predicted increased ASD traits; high birth weight and increased gender nonconformity predicted increased ASD traits
2015	VanderLaan et al	Case–control	Gender referred (n = 534), siblings (n = 419), non-gender referred (n = 1,201)	Children referred to gender identity clinic service and their siblings, children referred for obsessional interests	CBCL: questions 9 and 66 (related to obsessionalism)	Significant increase in obsessionalism in boys and girls referred to gender identity clinic service compared with all other groups

(continued)

Table 1. Continued

Date	Author	Type of study	Patients, n	Recruitment	Diagnostic or screening tools	Results
2015	Skagerberg et al	Case-control	166 parents	Parents of children presenting with gender dysphoria	SRS, case note review for previous diagnosis of ASD, clinical assessment of gender dysphoria	No significant difference in mean SRS scores between case and control; no significant difference in mean SRS subscale scores between case and control
2015	Kaltiala-Heino et al	Cohort	47	Children under care of a gender identity clinic service	Case note review for previous diagnosis of ASD, clinical assessment of gender dysphoria	26% of those who had experienced gender dysphoria had previous diagnosis of ASD

ADHD = attention-deficit/hyperactivity disorder; ADI = Autism Diagnostic Interview; ADI-R = Autism Diagnostic Interview—Revised; ADOS = Autistic Diagnostic Observation Schedule; ASD = autism spectrum disorder; CBCL = Child Behavior Checklist; DISCO-10 = Diagnostic Interview for Social and Communication Disorder; DSM-IV-TR = *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision*; EQ = Empathy Quotient; GIQC = Gender Identity Questionnaire for Children; ICD-10 = *International Classification of Diseases, 10th Edition*; MGIT = Michigan Gender Identity Test; NOS = not otherwise specified; SQ = Systemizing Quotient; SRS = Social Responsiveness Scale.

to examine gender variance among children ( $n = 554$ ) and adolescents ( $n = 147$ ) who were primarily diagnosed with a range of neurodevelopment disorders, including ASD. A chart review was conducted and ASD was measured using the Autism Diagnostic Interview<sup>45</sup> or Autism Diagnostic Interview—Revised,<sup>46</sup> which is a detailed parent interview of developmental history and autism symptoms. The Autistic Diagnostic Observation Schedule<sup>47</sup> also was used; this tool is a structured play and conversational interview to elicit symptoms of ASD. Higher scores indicate greater autism. The findings showed that compared with controls, children and adolescents with ASD were 7.59 times more likely to express gender variance. However, the CBCL was used to assess gender variance, which might have limited the findings because this tool is a parent checklist used to detect emotional and behavioral problems. This study would have benefited from using a more specific measurement of gender dysphoria (eg, Utrecht Gender Dysphoria Scale).

VanderLaan et al<sup>29</sup> went on to try to establish predictive factors for ASD traits in children ( $n = 49$ ) diagnosed with gender dysphoria. The parents of the children were asked to complete the SRS,<sup>34</sup> which requires parents to rate social awareness, social cognition, social communication, social motivation, and repetitive behaviors of their child. It is a validated tool and differentiates among mild ASD, high functioning ASD, and severe autism. Gender nonconformity was assessed using the Gender Identity Questionnaire for Children,<sup>48</sup> which also is a parent report questionnaire. The study found that gender nonconformity and high birth weight were, independently and combined, a predictive factor for increased ASD traits. Limiting these findings was the reliance on parent report questionnaires, which are not diagnostic tools. Another study using the SRS<sup>33</sup> compared the responses of 166 parents of children presenting with gender dysphoria to a previously established SRS mean.<sup>49</sup> This study found that 54.2% of children and adolescents in the study scored in the mild to moderate and severe range, indicating difficulties in social behavior. No difference was found in autistic features between natal girls and boys. The investigators concluded that the large number of participants who showed an indication of ASD reflects the poor specificity of the SRS when used with individuals who present with symptoms of gender dysphoria.

More recently, VanderLaan et al<sup>36</sup> recruited children referred to a gender identity clinic, their siblings, and children referred for intense or obsessional interests. Questions 9 (obsession) and 66 (compulsion) were used from the CBCL, which is used as a method for identifying problematic behavior in children. A significant increase in obsession was noted in boys and girls referred to a gender identity clinic compared with the three other groups. In addition, a significant increase in compulsion was found for boys and girls referred to a gender identity clinic compared with their siblings and non-gender clinic referred children. This study has a very good level of participants, including children referred to a gender identity clinic ( $n = 534$ ), their siblings ( $n = 419$ ), and non-gender clinic referred children ( $n = 1,201$ ), but relies

**Table 2.** Study Characteristics of Case Studies

Date	Author	Age (y)	Symptoms	Natal gender	Comorbidity	Impression
1996	Williams et al	5 and 3	Gender dysphoria and diagnosed ASD	Male	Younger child degree of developmental delay	Queried manifestation of ASD or gender dysphoria
1997	Landén and Rasmussen	14	Gender dysphoria symptoms from 8 y old and diagnosed ASD	Female	OCD	Transsexualism as result of ASD and/or OCD but possibly independent disorders; perhaps manage as transsexualism
2002	Mukaddes	10 and 7	Gender dysphoria symptoms and diagnosed ASD	Male	None stated	Persistent gender identity at 4-year follow-up
2003	Perera et al	9	Gender dysphoria symptoms and diagnosed ASD	Female	OCD	Continuation of OCD symptoms and lessening of gender dysphoria during follow-up
2005	Kraemer et al	35	Gender dysphoria symptoms with diagnosed ASD	Male	None stated	Gender dysphoria developed secondary to adopting male emotional and cognitive traits owing to ASD rather than co-occurrence; gender dysphoria treated
2005	Galluci et al	41	Gender dysphoria symptoms with diagnosed ASD	Male	OCD	Queried whether secondary to comorbidity of OCD in ASD and gender dysphoria secondary to obsessive thoughts or gender dysphoria
2014	Lemaire et al	23	Gender dysphoria symptoms and requesting cross sex hormones and genital reconstructive surgery; diagnosed with ASD	Female	Borderline IQ	Gender dysphoria but also suggested treatment with psychotherapy before consideration of cross sex hormones and/or surgery
2014	Jacobs et al	29 and 20	Gender dysphoria with diagnosed ASD	Male	None stated	Treatment with cross sex hormones; however, struggled to present in recognizable female role; queried a struggle with theory of mind

ASD = autism spectrum disorder; OCD = obsessive compulsive disorder.



**Table 3.** Study Characteristics in Adults

Date	Author	Type of study	Patients, n	Recruitment	Diagnostic or screening tools	Results
2012	Jones et al	Case-control	Transmen (n = 61), transwomen (n = 128), control men (n = 76), control women (n = 98), patients with ASD (n = 125; taken from Wheelwright et al, 2006)	NHS Gender Identity Clinic and website	AQ, ASD diagnosed by Wheelwright et al by <i>DSM-IV</i> criteria	Transmen significantly higher mean on the AQ than transwomen and control women
2014	Pasterski et al	Case-control	Transwomen (n = 63), transmen (n = 28)	Private gender identity clinic	AQ	Mean AQ increased in transgendered patients but not significantly
2014	Bejerot and Eriksson	Case-control	ASD (n = 50), neurotypical (n = 53)	ASD: outpatient tertiary adult ASD clinic, community-based center for adults with ASD, website for adults with ASD; control: matched controls	ADOS, Wechsler Intelligence Scale, MF Scale (validated Swedish modification of BSRI)	"Masculinity" was significantly less in those with ASD than in controls

ADOS = Autistic Diagnostic Observation Schedule; AQ = Autistic Quotient; ASD = autism spectrum disorder; BSRI = Bem Sex Role Inventory; *DSM-IV* = *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition*; NHS = Nation Health Service.

on only two questions about obsession, which might limit the validity of the findings.

Another recent study reported an overrepresentation of severe adolescent developmental disorders in children under the care of a Finnish gender identity clinic for 2 years.<sup>30</sup> Twelve children (26%) in their total sample had previously been diagnosed with ASD according to a psychiatric case note review. No re-establishment of the diagnosis of ASD was made, which limits the validity of the findings.

There also have been several case studies describing ASD in children and adolescents with gender dysphoria. For example, Williams et al<sup>21</sup> discussed "cross-gender preoccupation" in two natal autistic boys (5 and 3 years old). These children showed more interest in feminine toys than in masculine toys and enjoyed cross-dressing. For the eldest, after a 1-year follow-up, the cross-dressing and preference for feminine toys remained, despite improvement in their psychological function. The investigators believed this was a likely manifestation of the children's autism, but did query GID. A year later Landén and Rasmussen<sup>22</sup> reported the case of a 14-year-old natal girl with a diagnosis of ASD and obsessive compulsive disorder (OCD) who at 8 years of age started to claim to be a boy. The child presented with clear gender dysphoric symptoms and these continued at follow-up. Mukaddes<sup>23</sup> described two natal boys with a diagnosis of high functioning autism who showed persistent gender identity incongruence that continued throughout a 4-year follow-up period. Perera et al<sup>24</sup> reported the case of a 20-year-old natal woman who had been followed since 9 years of age with

diagnoses of Asperger syndrome and OCD and who presented with GID. They reported a continuation of the OCD symptoms but a lessening of the GID symptoms at follow-ups.

Overall, the literature in children and adolescents with gender dysphoria and ASD is very limited and relies primarily on case reports. Although case studies can provide an in-depth discussion about the complex interplay between ASD and symptoms of gender dysphoria (and in some cases other disorders), they are limited by the fact that they cannot be generalized. Nevertheless, robust studies conducted in this area suggest that the prevalence rates of ASD in children and adolescents with symptoms of gender dysphoria are considerably higher than in the general population.

### Publications on Adults

Of the 19 articles, 7 were concerned with adults. A summary of all the studies is presented in Tables 2 and 3. Two case-control studies<sup>16,31</sup> used the AQ<sup>50</sup> to determine whether trans people had more autistic traits compared with a general and an ASD population. These studies recruited patients from a gender identity clinic service. The AQ, which is validated, is a screening instrument and not a diagnostic tool for ASD. Scoring highly on the AQ predicts a higher likelihood of the presence of ASD as opposed to being diagnostic of ASD. Jones et al<sup>31</sup> found that transmen scored significantly higher on the AQ than transwomen and control women. The AQ was significantly higher for all trans people compared with the general population. The study also found that homosexual transwomen had significantly higher AQ levels than

heterosexual transwomen. Interestingly, Pasterski et al,<sup>16</sup> who used a very similar design, found no significant difference between any of the trans people or general population groups. The difference might be related to the control group, because Pasterski et al<sup>16</sup> used previously published figures<sup>51</sup> instead of recruited controls.

A case-control study by Bejerot and Eriksson<sup>32</sup> explored sex and gender role orientation using the Swedish modification of the Bem Sex Role Inventory.<sup>52</sup> People diagnosed with ASD (n = 50) were compared with a matched control group (n = 53) according to natal gender, age, education, and having children. Atypical gender identity was reported to be significantly higher in people with ASD (11.5%) compared with controls (3.6%). This difference lost statistical significance when the group was divided by natal gender. Natal men and natal women in the ASD group were found to present with significantly less masculinity compared with controls. The study explores an interesting area, although no formal diagnosis of gender dysphoria or transsexualism was made. Another potential limitation is that the study stereotypes what constitutes masculine and feminine ideas and behavior according to the Bem Sex Role Inventory.

Once again, there is lack of scientific research in this area and most of the relevant publications consist of case studies. For example, Kraemer et al<sup>27</sup> described the case of a 35-year-old natal woman with a diagnosis of Asperger syndrome who also fulfilled the *DSM-IV* diagnostic criteria for GID. The investigators believed that GID developed secondary to adopting male emotional and cognitive traits owing to Asperger syndrome, rather than a true co-occurrence. After treatment for GID, good social functioning was reported. The same year, Galluci et al<sup>25</sup> reported the case of a 41-year-old natal male with a diagnosis of high functioning autism or Asperger syndrome who presented with symptoms of gender dysphoria. The investigators discussed whether the gender incongruence was part of OCD or part of a diagnosis of gender dysphoria.

Lemaire et al<sup>26</sup> described a 23-year-old natal woman with GID, ASD, and a borderline IQ level. The case study described not only the clinical presentation but also the treatment. The investigators suggested that before consideration for cross-sex hormone treatment or surgical intervention, speech and communication therapy should be completed. Similarly, Jacobs et al<sup>13</sup> discussed the cases of 29- and 18-year-old natal men diagnosed with ASD. The older man presented with gender dysphoric feelings, but little wish to undergo a social role transition. The younger man presented with clear gender dysphoric feelings. The authors suggested these men had transitioned in their mind but had failed to make external changes to their presentation. Therefore, those around them struggled to recognize them as women.

In summary, similar to the literature in children and adolescents, there has been a limited amount of publications investigating the relation between ASD and gender dysphoria in adults. The studies that have been conducted appear to suggest that, in

some cases, there is a co-occurrence between symptoms of gender dysphoria and ASD, although the studies are more limited and less robust than those in the child and adolescent literature. Most of these studies described prevalence rates and no studies specifically discussed the influence of any of the diagnoses on treatment outcomes.

## DISCUSSION

The aim of this systematic review was to critically describe the literature regarding the co-occurrence of gender dysphoria and ASD. Although the literature was limited, especially in relation to adults, overall, this systematic review found a high prevalence of ASD in people with gender dysphoria attending clinical services.

There are several potential explanations for the co-occurrence between gender dysphoria and ASD. Some investigators<sup>16,31,32</sup> have discussed whether the extreme male brain theory<sup>53</sup> plays a role in this association. This theory postulates that the brains of typical men and women have two domains: empathizing and systemizing. The empathizing component includes having an appropriate emotional reaction to another person's thoughts and feelings. Systemizing is the drive to analyze or construct systems. Within the general population, typical women are thought to display more empathizing and less systemizing traits compared with typical men. Studies assessing these brain domains in people (male and female) with ASD have found an extreme version of the male brain, where systemizing is above average and empathy is decreased.<sup>54,55</sup> It has been hypothesized that high levels of fetal testosterone are responsible for the extreme male brain.<sup>56</sup> This theory could account for the co-occurrence of gender dysphoria and ASD in transmen (natal women), but not in transwomen.<sup>22</sup> This research alone highlights how the co-occurrence between ASD and gender dysphoria is likely to be complex and that there might be different mechanisms underlying ASD and gender dysphoria in men and women.<sup>16</sup>

It also has been hypothesized that sex hormones could account for the association between ASD and gender dysphoria. Autistic traits displayed during childhood have been positively related to fetal testosterone.<sup>53,57,58</sup> Children diagnosed with ASD, especially girls, have shown increased androgens<sup>59</sup> and reported more androgen-related disorders.<sup>60</sup> Similarly, the main mechanism responsible for gender identity involves a direct effect (or lack) of testosterone on the developing human brain, as seen in certain conditions. For instance, people with intersex and related conditions who have been exposed to prenatal androgen levels that are at variance to their genotype (male or female sex chromosomes) or their assigned birth gender are much more likely to change from the gender they were assigned at birth than persons without these conditions.<sup>61–64</sup> However, although this theory suggests that natal girls with ASD present with increased testosterone levels, an association between high levels of testosterone in girls and gender dysphoria has not been found. Bejerot and Eriksson<sup>32</sup> also believed that the androgen hypothesis of ASD did not explain the androgynous physical features of people



diagnosed with ASD; therefore, they set out to assess physical measurements, related to androgen influence, in adults with and without ASD. They found that women diagnosed with ASD had increased serum testosterone levels and displayed more masculine traits than women without ASD. In addition, men with ASD displayed more feminine characteristics than men without ASD. They concluded that rather than being a disorder characterized by masculinization in men and women, ASD seems to be a gender defiant disorder and therefore gender incongruence should be expected in patients with ASD.

The co-occurrence of ASD and gender dysphoria also could be a reflection of the impairment in empathy that is characteristic of people with ASD. Many people with ASD report that they are puzzled by how to respond to another person's emotions.<sup>65</sup> For example, they might be able to see that someone is crying, deduce that that person is sad or upset, but not know why, or how to comfort that person. This impairment in empathy might facilitate them "coming out" and pursuing their true beliefs, in this case transitioning to their experienced gender, without being prevented by societal prejudices or without being influenced by what other people think about their decision.

It also must be considered that other factors are likely to contribute to the etiology of ASD, gender dysphoria, and their co-occurrence. For instance, Robinow<sup>17</sup> claimed that the presence of gender dysphoria later in life can be traced back to difficulties within the relationship between mother and child during the first 2 years of the child's life. Hey suggested that issues within this relationship can be responsible for the activation (or deactivation) of specific genes. For instance, Fonagy and Target<sup>66</sup> implied that without the capacity for Theory of Mind (which is thought to be lacking and universal in people with ASD<sup>67</sup>), attachment bonds do not form; however, attachment bonds early in life are crucial to the development of gender identity.<sup>68</sup>

An issue with all hypotheses that attempt to account for the co-occurrence of gender dysphoria and ASD is specificity. It needs to be determined whether elevated traits of ASD are specific to patients with gender dysphoria or a characteristic of this clinical population more generally.<sup>69</sup>

### Limitations of the Current Literature

The limited literature in this field does not allow for clear conclusions regarding the prevalence or etiology of ASD in trans people. Studies using good diagnostic procedures or tools are usually limited by the small numbers of subjects; however, when the number of cases increases, the validity of the diagnosis of ASD or gender dysphoria is limited. The stronger and more reliable studies have been conducted with children, showing an overall higher prevalence of ASD in children referred to gender identity clinic services.<sup>12</sup> The increased prevalence rates reported might be due to different reasons. For instance, the number of referrals being received by gender identity clinic services in North America and Europe has increased substantially over the years.<sup>70,71</sup> The increase in prevalence over the years is likely to be

due to several factors: the increased visibility of trans people in the media, which likely contributes to at least a partial de-stigmatization of being trans<sup>70</sup>; the wide availability of information on the Internet about trans people, which also likely contributes to de-stigmatization<sup>70</sup>; the increased awareness of the availability of biomedical treatment<sup>2–4</sup>; and the development of societal tolerance toward trans individuals.<sup>72</sup> Perhaps trans individuals with ASD have less reservation to seek referral to gender identity clinic services, as explained earlier, and therefore constitute a relative overrepresentation within clinical samples.

One limitation that remains is the fact that much of the research has been conducted with those who have been referred to a gender identity clinic. Such a sample is comparably smaller to querying a diagnosis of gender dysphoria within the larger ASD population. Therefore, these studies at best present the prevalence of ASD in those wishing assessment or treatment for their gender dysphoria.

Little has been written about the treatment and potential difficulties within the trans population presenting with previously diagnosed and undiagnosed ASD. To the authors' knowledge, there have not been any reports of outcomes or increased rates of dissatisfaction, de-transition, or postoperative regret in this population. Nevertheless, there remains ongoing clinical concern regarding misdiagnosis, informed consent, or potential treatment difficulties relating to cross-sex hormone treatment and sex reassignment surgeries.

### Clinical Implications for the Co-Occurrence Between ASD and Gender Dysphoria

The assessment of gender dysphoria in individuals with ASD can become more complex owing to some of the difficulties experienced by those with ASD. These could include difficulties in communication, shared psychological conceptualization, and in the building of a therapeutic relationship between the patient and the clinician. Specific examples include concerns of obsessional interests, concrete thinking, and the decreased or lack of Theory of Mind in patients with ASD and the subsequent potential lack of two-way gender recognition (a person's own internal thought of and experience of gender and the recognition of how others experience the expression of that person's gender). Another consideration is the specialist and time-consuming nature of recognizing the presence of and making the diagnosis of gender dysphoria and ASD, especially when being trained and experienced in these domains is rare. Social role transition and functional components often required before starting treatment, such as having a social or occupational function, can make navigating the treatment pathway more difficult. These difficulties become further compounded if the clinician has little experience of working with people with ASD. All of this can leave experienced and skilled clinicians feeling less confident about their assessment and treatment. This will have implications for the treatment of patients with gender dysphoria and ASD, ranging from an incomplete assessment to uncertainty about

whether to commence potentially irreversible treatment with cross-sex hormones and gender-related surgical procedures to a fear of potential adverse outcomes. Risk-adverse clinicians could undertreat patients. In turn, this could leave the patient feeling misunderstood, under-supported, and not receiving necessary treatment. Further experience of assessing and treating the gender dysphoria of those with ASD could start to allay much of these difficulties. However, only good-quality research about assessment procedures, any adaptations to the treatment pathway required, and robust treatment outcome evaluation will improve the situation.

Overall, there remain significant gaps in the understanding of the etiology of the potential co-occurrence of gender dysphoria and ASD, appropriate assessment and treatment, and outcome of treatment of trans people with ASD. Further research is required for educational and clinical purposes.

**Corresponding Author:** Dr Walter Pierre Bouman, Nottingham Centre for Gender Dysphoria, Nottinghamshire Healthcare NHS Trust, 3 Oxford Street, Nottingham NG1 5BH, UK. Tel: +44 115 8760160; E-mail: [walterbouman@doctors.org.uk](mailto:walterbouman@doctors.org.uk)

*Funding:* None.

*Conflict of Interest:* The authors report no conflicts of interest.

## STATEMENT OF AUTHORSHIP

### Category 1

#### (a) Conception and Design

Derek Glidden; Walter Pierre Bouman; Jon Arcelus

#### (b) Acquisition of Data

Derek Glidden; Jon Arcelus

#### (c) Analysis and Interpretation of Data

Derek Glidden; Walter Pierre Bouman; Jon Arcelus

### Category 2

#### (a) Drafting the Article

Derek Glidden; Walter Pierre Bouman; Bethany A. Jones; Jon Arcelus

#### (b) Revising It for Intellectual Content

Derek Glidden; Walter Pierre Bouman; Bethany A. Jones; Jon Arcelus

#### (c) Final Approval of the Completed Article

Derek Glidden; Walter Pierre Bouman; Bethany A. Jones; Jon Arcelus

## REFERENCES

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (fifth edition). Washington, DC: American Psychiatric Association; 2013.
2. Ahmad S, Barrett J, Beaini AY, Bouman WP, Davies A, Greener HM, et al. Gender dysphoria services: a guide for general practitioners and other healthcare staff. *Sex Relation Ther* 2013; 28:173.
3. Coleman E, Bockting W, Botzer M, Cohen-Kettenis P, DeCuypere G, Feldman J, et al. Standards of care for the health of transsexual, transgender, and gender-nonconforming people, version 7. *Int J Transgend* 2012; 13:165.
4. Wylie K, Barrett J, Besser M, Bouman WP, Bridgman M, Clayton A, et al. Good practice guidelines for the assessment and treatment of adults with gender dysphoria. *Sex Relation Ther* 2012; 29:154.
5. World Health Organisation. The ICD-10 classification of mental and behaviour disorders. 10th ed. Geneva: World Health Organisation; 1992.
6. Drescher J, Cohen-Kettenis P, Winter S. Minding the body: situating gender identity diagnoses in the ICD-11. *Int Rev Psychiatry* 2012; 24:568.
7. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (fourth edition, text revision). Washington DC: American Psychiatric Association; 2000.
8. Wålinder J. Incidence and sex ratio of transsexualism in Sweden. *Br J Psychiatry* 1971; 119:195.
9. Tsoi WF. The prevalence of transsexualism in Singapore. *Acta Psychiatr Scand* 1988; 78:501.
10. Zucker KJ, Lawrence AA. Epidemiology of gender identity disorder: recommendations for standards of care for the World Professional Association for Transgender Health. *Int J Transgend* 2009; 11:8.
11. Arcelus J, Bouman WP, Van De Noortgate W, Claes L, Witcomb GL, Fernandez-Aranda F. Systematic review and meta-analysis of prevalence studies in transsexualism. *Eur Psychiatry* 2015; 30:807.
12. De Vries AL, Noens IL, Cohen-Kettenis PT, van Berchelaer-Onnes IA, Doreleijers TA. Autism spectrum disorders in gender dysphoric children and adolescents. *J Autism Dev Disord* 2010; 40:930.
13. Jacobs LA, Rachlin K, Erickson-Schroth L, Jansson A. Gender dysphoria and co-occurring autism spectrum disorders: review, case examples and treatment considerations. *LGBT Health* 2014; 1:277.
14. Van Caenegem E, Wierck K, Elaut E, Buysse A, Dewaele A, Van Nieuwerburgh F, et al. Prevalence of gender nonconformity in Flanders, Belgium. *Arch Sex Behav* 2015; 44:1281.
15. Bloomberg SJ, Bramlet MD, Kogan MD, Schieve LA, Jones JR, Lu MC. Changes in prevalence of parent-reported autism spectrum disorder in school-aged U.S. children 2007–2012. *Natl Health Stat Rep* 2013; 65:1.
16. Pasterski V, Gilligan L, Curtis R. Traits of autism spectrum disorders in adults with gender dysphoria. *Arch Sex Behav* 2014; 43:387.
17. Robinow O. Paraphilia and transgenderism: a connection with Asperger's disorder? *Sexual Relation Ther* 2009; 24:143.
18. Van Schalkwyk GI, Klingensmith K, Volkmar FR. Gender identity and autism spectrum disorders. *Yale J Biol Med* 2015; 88:81.
19. Wood E, Halder N. Gender disorders in learning disability—a systematic review. *Tizard Learn Disabil Rev* 2014; 19:158.
20. Moher D, Liberati A, Tetzlaff J, Altman DG; PRISMA Group. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: the PRISMA statement. *PLoS Med* 2009; 6:e1000097.

21. Williams PG, Allard A, Sears L. Case study: cross-gender preoccupations in two male children with autism. *J Autism Dev Disord* 1996; 26:635.
22. Landén M, Rasmussen P. Gender identity disorder in a girl with autism—a case report. *Eur Child Adolesc Psychiatry* 1997; 6:170.
23. Mukaddes NM. Gender identity problems in autistic children. *Child Care Health Dev* 2002; 24:529.
24. Perera H, Gadambanathan T, Weerasiri S. Gender identity disorder presenting in a girl with Asperger's disorder and obsessive compulsive disorder. *Ceylon Med J* 2003; 48:57.
25. Galluci G, Hackerman F, Schmidt CW. Gender identity disorder in an adult male with Asperger's syndrome. *Sex Disabil* 2005; 23:35.
26. Lemaire M, Thomazeau B, Bonnet-Brilhaut F. Gender identity disorder and autism spectrum disorder in a 23 year old female. *Arch Sex Behav* 2014; 43:395.
27. Kraemer B, Delsignore A, Gundelfinger R, Schnyder U, Hepp U. Comorbidity of Asperger syndrome and gender identity disorder. *Eur Child Adolesc Psychiatry* 2005; 14:292.
28. Abelson AG. The development of gender identity in the autistic child. *Child Care Health Dev* 1981; 7:347.
29. VanderLaan DP, Leef JH, Wood H, Hughes SK, Zucker KJ. Autism spectrum disorder risk factors and autistic traits in gender dysphoric children. *J Autism Dev Disord* 2015; 6:1742.
30. Kaltiala-Heino R, Sumia M, Töyläjärvi M, Lindberg N. Two years of gender identity service for minors: overrepresentation of natal girls with severe problems in adolescent development. *Child Adolesc Ment Health* 2015; 9:9.
31. Jones RM, Wheelwright S, Farrell K, Martin E, Green R, Di Ceglie D, et al. Brief report: female-to-male transsexual people and autistic traits. *J Autism Dev Disord* 2012; 42:301.
32. Bejerot S, Eriksson JM. Sexuality and gender role in autism spectrum disorder: a case control study. *PLoS One* 2014; 9:1.
33. Skagerberg E, Di Ceglie D, Carmichael P. Brief report: autistic features in children and adolescents with gender dysphoria. *J Autism Dev Disord* 2015; 45:2628.
34. Constantino JN, Gruber CP. Social Responsiveness Scale (SRS). Los Angeles, CA: Western Psychological Services; 2005.
35. Di Ceglie D, Skagerberg E, Baron-Cohen S, Auyeung B. Empathising and systemising in adolescents with gender dysphoria. *Opticon* 2014; 16:1.
36. VanderLaan DP, Postema L, Wood H, Singh D, Fantus S, Hyun J, et al. Do children with gender dysphoria have intense/obsessional interests? *J Sex Res* 2015; 52:213.
37. Strang FJ, Kenworthy L, Dominska A, Sokoloff J, Kenealy EL, Berl M, et al. Increased gender variance in autism spectrum disorders and attention deficit hyperactivity disorder. *Arch Sex Behav* 2014; 43:1525.
38. Paluszny M, Beit-Hallahmi B, Catford JC, Cooley R, Dull C, Guiora AZ. Gender identity and its measurement in young children. *Compr Psychiat* 1973; 14:281.
39. Gesell A, Halverson HM, Thompson H, Ilg FL, Costner BM, Ames LB, et al. The first five years of life: a guide to the study of the preschool child. New York: Harper; 1940.
40. Zucker KJ, Bradley SJ. Gender identity disorder and psychosexual problems in children and adolescents. New York: Guilford; 1995.
41. Cohen-Kettenis P, Pfäfflin F. Transgenderism and intersexuality in childhood and adolescence. Thousand Oaks, CA: Sage; 2003.
42. Wallien MSC, Cohen-Kettenis PT. Psychosexual outcomes of gender dysphoric children. *J Am Acad Child Adolesc Psychiatry* 2008; 47:1413.
43. Fombonne E. Epidemiology of autistic disorder and other pervasive developmental disorders. *J Clin Psychiatry* 2005; 66:3.
44. Wing L, Leekam SR, Libby SJ, Gould J, Larcombe M. The diagnostic interview for social and communication disorders: background, inter-rater reliability and clinical use. *J Child Psychol Psychiatry* 2002; 43:307.
45. Le Couteur A, Rutter M, Lord C, Rios P, Robertson S, Holdgrafer M, et al. Autism Diagnostic Interview: a standardized investigator-based instrument. *J Autism Dev Disord* 1989; 19:363.
46. Lord C, Rutter M, Le Couteur A. Autism Diagnostic Interview—Revised: a revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *J Autism Dev Disord* 1994; 24:659.
47. Lord C, Rutter M, DiLavore P, Risi S. Autism Diagnostic Observation Schedule. ADOS Manual. Los Angeles: Western Psychological Services; 2002.
48. Johnson LL, Bradley SJ, Birkenfeld-Adams AS, Kuksis MAR, Maing DM, Mitchell JN, et al. A parent-report gender identity questionnaire for children. *Arch Sex Behav* 2005; 33:105.
49. Wigham S, McConachie H, Tandos J, Le Couteur A; Gateshead Millennium Study Core Team. The reliability and validity of the Social Responsiveness Scale in a UK general child population. *Res Dev Disabil* 2012; 33:944.
50. Baron-Cohen S, Richler J, Bisarya D, Gurunathan N, Wheelwright S. The Autistic Spectrum Quotient (AQ): evidence from Asperger syndrome/high functioning autism, males and females, scientists and mathematicians. *J Autism Dev Disord* 2001; 31:5.
51. Wheelwright S, Baron-Cohen S, Goldenfield N, Delaney J, Fine DRS. Predicting autistic spectrum quotient from systemizing quotient—revised and empathy quotient. *J Autism Dev Disord* 2006; 1079:47.
52. Bem S. The measurement of psychological androgyny. *J Consult Clin Psychol* 1974; 42:155.
53. Baron-Cohen S. The extreme male brain theory of autism. *Trend Cogn Sci* 2002; 6:248.
54. Baron-Cohen S, Lombardo MV, Auyeung B, Ashwin E, Chakrabarti B, Knickmeyer R. Why are autism spectrum conditions more prevalent in males? *PLoS Biol* 2011; 9:e1001081.
55. Baron-Cohen S, Cassidy S, Auyeung B, Allison C, Achoukhi M, Robertson S, et al. Attenuation of typical sex differences in 800 adults with autism vs. 3,900 controls. *PLoS One* 2014; 9:e102251.
56. Auyeung B, Baron-Cohen S, Ashwin E, Knickmeyer R, Taylor K, Hackett G. Fetal testosterone and autistic traits. *Br J Psychol* 2009; 100:1.

57. Baron-Cohen S, Lutchmaya S, Knickmeyer RC. Prenatal testosterone in mind: amniotic fluid studies. Cambridge, MA: MIT Press; 2004.
58. Knickmeyer R, Baron-Cohen S, Raggatt P, Taylor K, Hackett G. Fetal testosterone and empathy. *Horm Behav* 2006; 49:282.
59. Geier AD, Geier RM. A prospective assessment of androgen levels in patients with autistic spectrum disorders: biochemical underpinnings and suggested therapies. *Neuroendocrinol Lett* 2007; 28:565.
60. Ingudomnukul E, Baron-Cohen S, Wheelwright S, Knickmeyer R. Elevated rates of testosterone-related disorders in women with autism spectrum conditions. *Horm Behav* 2007; 51:597.
61. Cohen-Kettenis PT. Gender change in 46,XY persons with 5 $\alpha$ -reductase-2 deficiency and 17 $\beta$ -hydroxysteroid dehydrogenase-3 deficiency. *Arch Sex Behav* 2005; 34:399.
62. Dessens AB, Slijper FME, Drop SLS. Gender dysphoria and gender change in chromosomal females with congenital adrenal hyperplasia. *Arch Sex Behav* 2005; 34:389.
63. Mazur T. Gender dysphoria and gender change in androgen insensitivity or micropenis. *Arch Sex Behav* 2005; 34:411.
64. Meyer-Bahlburg HFL. Gender identity outcome in female-raised 46,XY persons with penile agenesis, cloacal exstrophy of the bladder, or penile ablation. *Arch Sex Behav* 2005; 34:423.
65. Grandin T. Thinking in pictures. Vancouver, WA: Vintage Books; 1996.
66. Fonagy P, Target M. Early intervention and the development of self-regulation. *Psychoanal Inq* 2002; 22:307.
67. Baron-Cohen S. Theory of mind and autism: a fifteen year review. In: Baron-Cohen S, Tager-Flusberg H, Cohen DJ, eds. *Understanding other minds: perspectives from developmental cognitive neuroscience*. 2nd ed. New York: Oxford University Press; 2000: p. 3-30.
68. Coates S. Developmental research on childhood gender identity disorder. In: Fonagy P, Krause R, Leutzinger B, eds. *Identity, gender and sexuality, 150 years after Freud*. London: International Psychoanalytic Association; 2006.
69. Zucker KJ, Leef JH, Wood H, Hughes SK, Wasserman L, Vanderlaan DP. LinkedIn? On the relation between gender dysphoria and traits of autism spectrum disorder in children. Paper presented at the International Academy of Sex Research. August 2015; Toronto, Canada.
70. Aitken M, Steensma TD, Blanchard R, VanderLaan DP, Wood H, Fuentes A, et al. Evidence for an altered sex ratio in clinic-referred adolescents with gender dysphoria. *J Sex Med* 2015; 12:756.
71. De Vries ALC, Kreukels BPC, T'Sjoen G, Ålgars M, Mattila A. Increase of referrals to gender identity clinics: a European trend? In: *Transgender Healthcare in Europe. Book of Abstracts*. Ghent, Belgium: European Professional Association of Transgender Health (EPATH); 2015. p. 10. <http://epath.eu/wp-content/uploads/2014/07/EPATH-2015-Book-of-Abstracts.pdf>. Accessed April 8, 2015.
72. Keuzenkamp S, Kuyper L. *Acceptance of LGBT individuals in the Netherlands 2013*. The Hague: The Netherlands Institute of Social Research (ED); 2013.