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Transidentities and autism spectrum disorder: A systematic review

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1. Introduction

Transidentities refer to all gender identities that do not conform to the gender assigned at birth. According to the Diagnostic and Statistical Manual of Mental Disorders, 5th version (DSM-5) (American Psychiatric Association, 2013), gender dysphoria (GD) comprises the notion of perceived suffering or impairment in the social field experienced by a transgender person. In the International Classification of Diseases, 11th version (ICD-11) (World Health Organisation, 2020), transidentities are referred to as "gender incongruence" and are no longer considered a mental disorder but a sexual health condition. Indeed, transidentities are no longer seen as a medical condition but as a singular construction of identity within human diversity. Gender incongruence is defined as marked and persistent incongruence between a person's experience of gender and their assigned sex at birth. Nonstereotypical gender behaviours and preferences are not sufficient to evoke gender incongruence. In some cases, transidentities require specialised multidisciplinary care to help express authentic gender identity. Currently, for children and adolescents, after obtaining the parental consent, this care begins with psychological and/or child psychiatric follow-up designed to accompany the subject and their family, to alleviate suffering if present, to explore gender and its expression in a supportive and benevolent framework, and to evaluate and manage possible psychiatric co-occurrences. In this article, the term "co-occurrence" is used instead of "comorbidities" to refer to psychiatric disorders associated with transidentity in an attempt to depathologise them.

Autism is a neurodevelopmental disorder characterised by difficulties with social interactions and verbal and nonverbal communication, restricted and stereotyped activities and interests, and sensory features. In the DSM-5 (American Psychiatric Association, 2013) and ICD-11 (World Health Organisation, 2020), autism is referred to as "autism spectrum disorder" (ASD), which is defined by persistent deficits in initiating and maintaining reciprocal social communication and social interactions and restricted and repetitive patterns of behaviours, interests and sensory activities that are atypical or excessive for the individual's age and/or sociocultural environment. Signs of autism appear during development, typically in early

childhood. However, not all symptoms occur at the same time and some may be aggravated when social demands exceed the individual's coping skills.

Over the past twenty years, the literature has highlighted the frequency of the association of transidentities and autism, proposing numerous theories to explain this observation, describing the characteristics of transidentities in people with autism, studying their psychiatric co-occurrences and recommending specialised care. A growing number of studies are emerging, including meta-analysis affirming higher prevalence of this co-occurrence (Glidden et al., 2016; Kallitsounaki & Williams, 2022; Øien, Cicchetti, et al., 2018; Thrower et al., 2020), and an increasing number of people living with this co-occurrence are seeking appropriate care in specialised centres. Nonetheless, studies about the specifics of this co-occurrence in terms of clinical and social consequences and the particularities of specialised care are sparse. No systematic review exists to propose an inventory of the existing knowledge. We summarise the hypotheses, observations and recommendations already published. This work has not been done previously in the literature, as the existing systematic reviews focus mainly on the frequency of the co-occurrence.

2. Method

For this systematic review of the literature, we followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) recommendations. Bibliographic resources were searched on PubMed, Epistemonikos, PsychINFO, Google Scholar, and Taylor and Francis Online in February 2021 and updated in April 2022. Additional articles were added from citations of selected articles or through a simple search of Google and Research Gate for completeness. Keywords used include the following: 'gender dysphoria' OR 'transgender' OR 'gender incongruency' AND 'autism spectrum disorder' OR 'autism'. The studies of interest are those focused on the co-occurrence of transgender identity and autism in children, adolescents and adults.

In terms of eligibility criteria, clinical studies and case reports were included. Given the low frequency of trans and autistic people in the general population and the recent interest in this co-occurrence, studies using screening scales were also included. However, we excluded studies with self-reported diagnoses (see supplement material).

The articles were initially selected on the basis of their titles and then based on keywords and summaries. Then, the articles were read in their entirety. Some were then excluded because they did not directly address the co-occurrence of transidentity and autism. A flow diagram of the study is provided in Figure 1. A total of 383 articles were found by searching scientific websites. Twenty-nine articles were eliminated as duplicates. Seven were excluded because they were written in a language other than English or French. A total of 237 studies were rejected after reading their titles. Nine works were excluded after reading their abstracts, and 24 were excluded after reading their full content. Twenty-two articles were selected from the bibliographic references of articles or after a simple search of Google and Research Gate. In total, we selected 77 articles published from 1996 to April 2022 for this literature review.

3. Results

3.1 Frequencies

A number of authors have noted an overrepresentation of transidentities among people with autism and of autism among transgender people. These authors have therefore sought to measure the frequencies within these populations. These studies are listed in Tables 1 and 2.

Due to its more robust methodology, De Vries et al. study (de Vries et al., 2010) serves as a reference for the frequency of ASD among children and adolescents (N=204) followed up in a specialised consultation for GD. They used standardized clinical instruments for both diagnoses (see table1). The overall frequency of ASD among children and adolescents seeking care for GD is 7.8% (de Vries et al., 2010), which is 4 times higher than that in the general population (Maenner et al., 2020). In the group of prepubertal children, 6.4% had a DISCO-10 score in favour of ASD. At the one-year follow-up, 86% of these children no longer showed criteria for GD and were living in their gender assigned at birth. Similar results are found in some studies of neurotypical children (Singh et al., 2021). In the adolescent group, 9.4% had a DISCO-10 score in favour of ASD.

Distinguishing age and population, frequencies in clinical studies vary in adults from 5.5%, (Pasterski et al., 2014) to 29.6% using the AQ-50 (Autism Quotient scale) (R. M. Jones et al., 2012). Only one community survey found a prevalence of 39% for autistic traits using the AQ-10 (but 13% of self-declared autism) in a population of gender variant adults (Kristensen & Broome, 2015). In children and adolescents, frequencies vary from 6.3% using retrospective

clinical diagnosis (Nahata et al., 2017) to 27.1% using the SRS (Social Responsiveness Scale) (Skagerberg et al., 2015).

The results are heterogeneous. This may be explained by the use of various tools, some validated for diagnosis and others validated for screening. The latter have most likely led to an overestimation of the frequency of autism in studies using them. For example, the Social Responsiveness Scale (SRS) can reach high scores, in particular due to social anxiety symptoms, which are also frequently found in transgender people (Manjra & Masic, 2022). Nevertheless, all studies conducted in children, adolescents and adults are in favour of an overrepresentation of autism in transgender people compared to the general population.

Regarding the frequency of gender dysphoria and transidentity in autistic people (Table 2), frequencies vary from 0.07% (Hisle-Gorman et al., 2019) to 31% (Kalafarski, 2010). Depending on the study, in children and adolescents, frequencies range from 0.07 (Hisle-Gorman et al., 2019) to 5.4% (Strang et al., 2014). These results are always higher than those found in the control groups. It appears that a significant proportion of people with autism have a nonbinary gender identity. However, a large number of nonbinary people are not seeking medical treatment. The estimated frequency results, mostly from clinical populations, are therefore probably underestimated (Strang, Van Der Miesen, et al., 2020). Furthermore, for children and adolescents, these studies mostly use Child Behavior Check List (CBCL) question 110 on "wishing to be of the opposite sex", which is completed by parents, and therefore is not based on the subject's internal experience and does not reflect the full complexity of transidentities (Manjra & Masic, 2022).

3.2 Sex Ratio

In several studies on the co-occurrence of autism and transidentity, the sex ratio balances out (Hisle-Gorman et al., 2019; Janssen et al., 2016; Shumer et al., 2016; Strang et al., 2014; Strauss et al., 2021; van der Miesen, Hurley, et al., 2018). However, the results are not always consistent. Some authors report that a majority of transgender autistic people are assigned as female at birth (Brunissen et al., 2021; Dewinter et al., 2017; Kaltiala-Heino et al., 2019; Munoz Murakami et al., 2022; Nabbijohn et al., 2019; Walsh et al., 2018). Brunissen et al. suggest that puberty in individuals assigned as female at birth induces more significant body changes than in individuals assigned as male. These changes, in people with autism, could cause trauma,

leading to a feeling of gender incongruence or even GD, which would therefore be more frequent in people assigned as female at birth (Brunissen et al., 2021). Conversely, Heylens et al. reported a sex ratio of 2.75 transgender women to one transgender man with autistic traits (Heylens et al., 2018).

3.3 Theories explicating co-occurrence

Several theories have been proposed to account for the links between transidentities and autism. These hypotheses can be grouped into four categories: biological, genetic, social and psychological. In this article, we propose to detail only the theories that are still being debated. The others are presented in Table 3.

Among the biological hypotheses, the most studied is the Extreme Male Brain Theory developed by Baron-Cohen in 2002 and influenced by 1944 writings from Asperger, who described autistic syndrome as an "extreme variant of male intelligence". Authors argue that autistic women have less empathy than neurotypical women. They have few typically female characteristics and interests more similar to men's interests, favouring the development of GD. Kung included nonbinary people to assess the presence of autistic traits and found the same results (Kung, 2020). Baron-Cohen implies a common biological origin for the co-occurrence (Baron-Cohen, 2002; Di Ceglie et al., 2014; Lai et al., 2016). The common biological marker would be elevated foetal testosterone during pregnancy or hyperandrogenism during life (Auyeung et al., 2009; Ingudomnukul et al., 2007; Pohl et al., 2014). However, this hypothesis would not explain transidentities and GD in individuals with autism assigned male at birth. Instead, other authors suggest that ASD induces androgynous characteristics, which can lead to GD (Bejerot & Eriksson, 2014; James & Grech, 2020). The cooccurrence is linked to exposure to endocrine disruptors (Bejerot et al., 2011). However, these theories are based on gender stereotypes. A deviation from these stereotypes is overinterpreted as transidentity (Laflamme, 2020). Most of these studies rely on the evaluation of participants' femininity and masculinity by others without taking into account the internal sense of gender identity of the observed participants.

Robinow hypothesised that early interactions between a child and their mother allow the activation of genes involved in the development of sexual orientation and gender identity. In

children with Asperger's syndrome, these interactions are disrupted, preventing the activation of these genes (Robinow, 2009). However, to date, no such genes have been identified.

Some authors have questioned the presence of social difficulties in transgender people linked to the repeated discrimination they experience, which could lead to an overdiagnosis of autism in the trans population (Nobili et al., 2018; Skagerberg et al., 2015; Stagg & Vincent, 2019; Turban, 2018; Turban & van Schalkwyk, 2018a; van Schalkwyk, 2018; Vermaat et al., 2018). Van der Miesen et al. reject this theory, arguing that the symptoms of autism are well defined and differ from the social difficulties described in socially marginalised people (van der Miesen, Cohen-Kettenis, et al., 2018). However, studies investigating autistic traits in transgender people after gender-affirming hormonal treatment (Nobili et al., 2020), or puberty-blocking hormones (Russel et al., 2021) found persistence of autistic traits. The persistence of autistic traits after hormonotherapy jeopardize the biological theories and the hypothesis of overdiagnosis due to social difficulties.

Several authors propose a noncausal link to explain the cooccurrence, i.e., autism and transidentity are not the cause of one or the other, but their expressions influence each other when they cooccur. Social difficulties associated with autism result in poorer understanding of social norms, less internalisation of gender roles and attributes, less identification with a gender group, and less pressure on autistic people to perform typically gender-assigned behaviours (Cooper et al., 2018; Kalafarski, 2010; Sala et al., 2020; Strang, Powers, et al., 2018; Warrier et al., 2020). This allows people with autism to develop a greater diversity of gender expression, interests and identities than neurotypical people, who are more sensitive to social norms (Coleman-Smith et al., 2020; Z. Jones, 2017; Kourti & MacLeod, 2018; Strang, Van Der Miesen, et al., 2020). In this line of hypotheses, authors assume that autistic people are more often nonbinary than neurotypical people (Lawson, 2017), that femininity and masculinity are considered rigidly at their extremes by autistic people (George, 2016), and that female-assigned autistic individuals have less identification with social gender norms than male-assigned autistic individuals (Lai et al., 2015).

Other proposals are based on cognitive theories. During development, binary cognitive schemas are integrated and gender-incongruent ones are suppressed in individuals. However, this process does not take place in some people, particularly those with autism. Thus, the transgender experience would be qualitatively similar in neurotypical and autistic individuals

(Walsh et al., 2018), although the outcome would appear to differ. Other cognitive hypotheses have been formulated. (1) GD is related to the cognitive rigidity that characterises ASD (Jacobs et al., 2014; Lemaire et al., 2014). (2) The mentalization deficit, often present in people with autism, induces a lesser internalization of gender roles, a greater gender identity fluidity (Kallitsounaki & Williams, 2020b), and a lesser integration of the concept of gender constancy (Kallitsounaki et al., 2021). (3) The deficit of theory of mind often found in people with ASD leads to a different perception of one's own gender and a lower awareness of social pressures and prejudices (Glidden et al., 2016; Kallitsounaki & Williams, 2020b). Autistic people would then be more likely to express gender variance. Fisher conducts a qualitative study on gender identity development in 8 transgender autistic adolescents with GD: 6 felt that autism had not influenced their gender identity; 2 believed that autism may have had both positive and negative impacts on their gender identity, including that autism may have induced a desire for nonconformity with societal norms. The author assumes that transgender autistic people have fluid ideas about gender but that their behaviour is influenced by stereotypes (Fisher, 2019). All these studies suggest that several autistic traits and particularities can occur and explain the greater gender variance in autistic people than in neurotypical people.

3.4 Sexual orientation

Sexual orientation can be defined as a person’s identity to the gender or genders to which they are sexually attracted and/or have romantic feelings. Autistic people have more varied sexual orientation particularly same-sex attraction due to more heterosexist experiences, less sensitivity to social stigma, difficulties to find opposite-sex partners and more identification to same gender people allowing more attraction and romantic feelings (Qualls et al., 2018). In this review, we consider sexual orientation according to one’s felt gender. Several authors report a more varied sexual orientation in autistic individuals, particularly among those assigned female at birth, compared to control groups. This suggests that autistic traits directly influence sexual orientation, possibly as a result of less adherence to societal heteronormativity (Dewinter et al., 2017; George & Stokes, 2018; Pasterski et al., 2014). In addition, nonheterosexual individuals with ASD more often experience gender incongruence than heterosexual individuals with ASD meaning that gender identity in people with ASD may influence sexual orientation (George & Stokes, 2018). Yet, Vermaat et al. found no difference in sexual orientation between neurotypical people with GD and people with autistic traits and

GD, with almost half having a heterosexual orientation and the other half not (Vermaat et al., 2018). Violeta and Langer suggest that the sexuality of transgender people with ASD may change in the course of gender affirmation with greater embodiment of one's body (Violeta & Langer, 2017).

3.5 Clinical and social consequences of the co-occurrence

When GD occurs in autistic persons, several authors have questioned the age at which they become aware of their transidentity. Both qualitative (Strang, Powers, et al., 2018) and clinical studies suggest that awareness of transidentity generally occurs before puberty and more often than in neurotypical people (Sumia & Kaltiala, 2021). For other authors, transidentity awareness is more likely to occur in early puberty among autistic people as the concepts of gender may only make sense with the onset of bodily changes (Edwards-Leeper & Spack, 2012; Ehrensaft, 2018; Pasterski et al., 2014). Similarly, ASD may influence the disclosure of transidentity to others (Coleman-Smith et al., 2020).

With regard to the autistic profile of transgender people, studies mainly recruit people with good global functioning and good verbal skills who can narrate their life history, meaning individuals with mild to moderate autism. In a study by Hisle-Gorman et al., children with GD had an average age of 11.3 years at diagnosis of ASD, which is significantly higher than the average age of 6.5 years at diagnosis of ASD for cisgender children (Hisle-Gorman et al., 2019). In a qualitative study, Cooper et al. found that 44% of participants were diagnosed with autism after starting transgender care (Cooper et al., 2022). This later age of diagnosis might be precisely because of the mild presentations of ASD and the absence of associated intellectual disability (ID). Hisle-Gorman et al. found 9.4% of associated ID in people with co-occurring ASD and GD (Hisle-Gorman et al., 2019), whereas the frequency of ID in children with ASD is much higher (Delobel-Ayoub et al., 2020), and 33% of children with ASD included in the study by Maenner et al. had a co-occurring ID (Maenner et al., 2020). There is no consensus on the severity of GD in autistic versus neurotypical individuals. Strang et al. found that GD in young people with ASD is less intense and linked to less perceived social prejudice directed at them than in neurotypical transgender people (Strang et al., 2014). In contrast, Glidden suggests that GD is more severe in autistic individuals due to deficits in intersubjectivity and theory of mind. Indeed, many people with ASD do not understand that the responses of others to their gender expression may be at odds with the authentic gender experienced by the individual

(Glidden et al., 2016). The sensory characteristics of autistic people also appear to sometimes exacerbate GD (Cooper et al., 2022). Violeta and Langer posit that a lack of adjustment between the social responses of parents to their gender-incongruent child can induce trauma in the child inducing depersonalisation, derealisation, forgotten memories, and withdrawal with investment in creative and imaginative activities (Violeta & Langer, 2017).

Transgender boys seem to assert their transidentity more easily than transgender girls (Strang, Powers, et al., 2018). This can be explained by a lower tolerance from the social group and from society in general of typically feminine behaviour among people assigned male at birth (Coleman-Smith et al., 2020). However, some authors have assumed that autistic people exposing a gender variant expression in society are less likely than neurotypical people to identify social prejudice directed at them (Strang et al., 2014). This lesser awareness of social prejudice and of the intentionality of their interlocutor puts autistic people at risk, as they are more often victims of sexual aggression and harassment than the general population (Laflamme, 2020; Pecora et al., 2020). Transgender autistic people are more likely to experience negative sexual experiences than cisgender neurotypical women but not more likely than transgender neurotypical people or cisgender autistic women. Co-occurrence would therefore not constitute an additional risk (Pecora et al., 2020).

Furthermore, ASD in young people with GD is an additional risk factor for internalized disorders and poorer quality of life, physical health, emotional and social well-being and academic functioning (Mahfouda et al., 2019; Strauss et al., 2021). Individuals with GD and ASD also have more psychiatric co-occurrences than cisgender individuals with ASD (Chang et al., 2021; Sumia & Kaltiala, 2021; van der Miesen, Hurley, et al., 2018). GD-induced suffering, sometimes intense in individuals with significant ASD-related cognitive rigidity, can lead to severe self-aggressive behaviours (Strang, Meagher, et al., 2018). It appears that transidentity and autism are cumulative, rather than multiplicative, risks for depression and anxiety (Murphy et al., 2020), and anxiety is more intense in individuals with GD and ASD than in neurotypical individuals with GD before, during and after social and/or medical transition (Coleman-Smith et al., 2020). Executive function disorders that are more frequent in trans youth with ASD compared to neurotypical trans youth (Strang, Chen, et al., 2021) may explain why autism may exacerbate internalized disorders and suicidality in transgender individuals (Strang, Anthony, et al., 2021).

In contrast, May et al. and Corbett et al. do not find more psychiatric co-occurrences in gender-variant youth with ASD than in neurotypical youth with gender variance (Corbett et al., 2022; May et al., 2017). 'Camouflage' in autistic people is the act of compensating for the difficulties associated with autism to hide autistic traits from society. Hull et al. find that 'camouflage' does not worsen depression and anxiety in nonbinary people (Hull et al., 2021).

3.6 Co-occurrence care

Some young people seek transidentity specialist counselling to support them in exploring their gender (Strang, Powers, et al., 2018) in a supportive environment (Wood & Halder, 2014). At the end of this support, some young people identify with a cisgender identity and others identify with a transgender identity (Strang et al., 2019; van Vlerken et al., 2020). The consultation system also helps family members, other health professionals involved in care and teachers welcome these young people in a supportive environment that understands their difficulties (Øien, Bergman, et al., 2018). It is interesting to present gender as a continuum to young people and their parents, thus leaving room for nonbinarity and the possibility of a transition whose modalities will depend on the young person's experience (van Vlerken et al., 2020). The average age for the beginning of transidentity care in neurotypical children is 2.5 years before that in autistic children, starting on average 2 years after the diagnosis of autism (Kaltiala-Heino et al., 2019). This difference may be explained by a later awareness of transidentity in autistic children (Ehrensaft, 2018) or by a delay in the treatment of children with the co-occurrence. This delay could be linked to communication difficulties due to autism, with less expression of feelings of incongruence by the subject, to a lack of understanding from those around them, or to the assimilation of transidentity to restricted interests by those around them (Akgül et al., 2018). Indeed, these children and adolescents are frequently discredited and considered incapable of making decisions for themselves by family members, professionals and LGBTQIA+ associations. They encounter difficulties in accessing appropriate care (Autistic Self Advocacy Network et al., 2016; Coleman-Smith et al., 2020; Glidden et al., 2016; Hillier et al., 2020; Strang et al., 2019; Strang, Powers, et al., 2018; Van Der Miesen et al., 2016). However, in a group of 123 adults and adolescents, 17.2% of whom had autistic features, Lehmann et al. in 2020 found no significant difference in access to gender-affirming treatment between groups with and without autistic features (Lehmann et al., 2020). With little regard to social norms, autistic people may have a gender expression

that is not congruent with their birth-assigned sex without seeking gender-affirming medical treatment (Lawson, 2017). Conversely, some autistic trans youth, such as neurotypical trans youth, feel compelled to undergo a full medical transition to be more accepted by society (Powis, 2017). Transition does not always require a hormonal prescription or the performance of gender affirmation surgery. It should be adapted to the needs expressed by the person during their follow-up (Fisher, 2019). Nevertheless, George notes a higher proportion of transgender people with ASD who use gender affirmation treatment than for neurotypical transgender people (George, 2016).

Autistic people frequently have associated executive function disorders. Social and hormonal transitions can therefore be anxiety-provoking stages for autistic young people, as transitions require tolerance of change, flexibility, planning and social skills (Rudacille, 2016). Furthermore, social transition does not reduce the risk of suffering potentially induced by body changes during hormone therapy (Coleman-Smith et al., 2020). Thus, these individuals need significant support during follow-up in specialist counselling (Van Der Miesen et al., 2016). In 2018, Strang et al. proposed the first specific care recommendations for children and adolescents with ASD and gender incongruence (Strang, Meagher, et al., 2018). Given the high prevalence of gender incongruence among people with ASD, it seems relevant to systematically investigate binary and nonbinary experiences in these young people to identify possible gender incongruence and to be able to offer appropriate support (Strang, Van Der Miesen, et al., 2020). Appropriate materials with simple language and images can be helpful, such as the Genderbread Person, a didactic drawing by Samuel Killerman, a comedian and social rights activist seeking to promote gender equality (Killerman, 2017). To address executive function disorders, Strang et al. propose the use of a calendar, for example, in an online health portal, to remind people of consultation appointments and the different stages of care (Strang, Anthony, et al., 2021). The consultation areas could also be adapted to the sensory characteristics of autistic people, with, for example, dimmed lights, little noise and precise visual information without overstimulation in common rooms (Cooper et al., 2022).

Conversely, it is necessary to look for autism in any young person with gender incongruence. The presence of social difficulties in a transgender person is not always related to repeated social discrimination or to a lack of opportunities to develop a sense of social belonging and acceptance. These difficulties may mask autism. When this co-occurrence is identified, a

careful assessment of its consequences in terms of social interactions and communication is useful in adapting transidentity care (Strang, Meagher, et al., 2018). The clinical case of Baker and Shweikh illustrates the complexity of considering a diagnosis of ASD in a transgender person, particularly with co-occurring personality disorders, which can cause real social prejudice for the person (Baker & Shweikh, 2016) (Table 4).

The first specialised consultation for transidentity can be a source of intense anxiety for autistic people, as they have often already experienced a loss of credibility about their transidentity. It is therefore important to reassure them and to explain the system, the process and the purpose of the follow-up (Coleman-Smith et al., 2020). Discussing transidentity throughout the follow-up process can be anxiety provoking for autistic people. The use of written materials, from which people may verbalise comments or questions, can help in the choice of themes, depending on the person's personal progress (Lehmann & Leavey, 2017; Mendes & Maroney, 2020).

Strang et al. emphasise the importance of specific psycho-education and social support for these young people and their parents or legal guardians (Kuvalanka et al., 2018; Strang, Meagher, et al., 2018). With this in mind, Strang et al. sought to develop specific peer support groups for these adolescents, organised by a multidisciplinary team. Several topics are addressed in the group: practical and communicative aspects of transition, gender expression and exploration, the legal framework for transition, and dealing with bullying (Strang, Kenworthy, et al., 2020; Strang, Knauss, et al., 2020).

In 2018, Strang nevertheless insisted on the importance of continuing or establishing specific and specialised follow-up for ASD and, independently, a specific and specialised follow-up for gender incongruence (Strang, Janssen, et al., 2018). However, social skills training and applied behaviour analysis (ABA) offered to people with ASD can sometimes reinforce gender stereotypes (Brooks, 2015; Strang, Van Der Miesen, et al., 2020). Historically, ABA has also been offered to transgender people for a time to realign gender identity with the birth-assigned sex. Indeed, transidentity and autism were both considered asocial positions at the time (Shapira & Granek, 2019).

Autism may be associated with difficulties with imagination. Selinger nevertheless advises symbolic play with autistic children to help them explore gender while avoiding the introduction of rigid binary gender stereotypes (Selinger, 2018).

In schools, binary gender roles are often reinforced, such as through uniforms and a lack of privacy in changing rooms and toilets (Coleman-Smith et al., 2020). Lehmann and Leavey recommend gender and transidentity education in schools (Lehmann & Leavey, 2017) to enable young people experiencing gender incongruence to learn appropriate terminology so that they can understand what they are feeling, explain their feelings to those around them and receive early support and care (Hillier et al., 2020). Butler warns that these young people are at risk of harassment during their school years. She advises promoting adult-mediated dialogue among students around issues of relationships and gender and creating partnerships between schools and LGBTQIA+ organisations. The latter could also train school professionals in appropriate gender terminology and awareness of expressions and symbols that reinforce gender stereotypes. In schools where uniforms are compulsory, Butler calls for both female and male uniforms being provided to all students (Butler, 2017).

Some authors recommend sex education for the exploration of sexuality for people with co-occurrence because of the large number of nonheterosexual people and the high risk of sexual assaults and negative sexual experiences (Sala et al., 2020; van Schalkwyk et al., 2015).

Sala et al. also recommend that clinicians refer young people to, in addition to specialised follow-up, community support groups, possibly via the internet, and offer materials such as books, websites, films or documentaries to allow a sense of identification with a peer group (Lawson, 2015; Sala et al., 2020). However, in a qualitative study, most participants reported experiencing stress in certain associative contexts, such as when meeting many people in noisy settings (Coleman-Smith et al., 2020). Emily Brooks, a nonbinary person with autism, reported having a negative experience in 2015 (Brooks, 2015). It is therefore important to know the associations and to refer autistic people to suitable events at the right time.

From a medical care perspective, Strang et al. address the issue of fertility preservation, particularly in autistic adolescents. It appears that these young people are demanding clear and comprehensive information about fertility preservation and the effects of hormonal and surgical treatments on fertility. Almost half of the adolescents considered fertility preservation

to be an intervention, with no significant difference between autistic and neurotypical youth. Strang et al. propose a questionnaire adapted to autistic people to introduce a discussion with young people and their parents on this procedure, which is sometimes difficult to envisage for people who do not have or do not yet have the desire to have children (Strang, Jarin, et al., 2018).

A thorough psychological assessment should be conducted to look for psychiatric pathologies. As with neurotypical transgender people, the WPATH recommends initiating co-occurrence treatment before offering gender affirmation treatment (Coleman et al., 2012; Strang, Meagher, et al., 2018).

Hormone therapy and surgery should be accessible to autistic transgender people (Van Der Miesen et al., 2016; van Schalkwyk et al., 2015). However, in 2021, Strauss et al. reported that gender-affirming treatments are less accessible for autistic people than for neurotypical people (Strauss et al., 2021). Information must be delivered in a complete and clear manner, adapted to the person's level of understanding. The care pathway is then individualised (Condat, 2016). Autism is not a condition that prevents young people from understanding their bodies, their needs and their gender identity (Strang, Meagher, et al., 2018). In 2021, Pham et al. described the care pathway of three young trans people with ASD and an eating disorder (Table 4). The authors affirm the importance of multidisciplinary follow-up in these cases, in which the relationship to the body is often atypical or even disturbed. However, they point out that with appropriate care, gender affirmation treatments are not contraindicated (Pham et al., 2021). In a qualitative study, participants with GD and ASD reported an improvement in their psychological health and better overall functioning, including social functioning, after the initiation of hormone therapy (Coleman-Smith et al., 2020). Strang et al. found an improvement in executive functions in transgender individuals with ASD who received gender-affirming hormone treatment. The authors speculate that this may be indirectly related to an improvement in depression and anxiety when these co-occur, but the hormones may also directly reduce the cognitive interference of gender incongruence and allow for cognitive maturation and better emotional control. On the other hand, prolonged prescription of puberty blockers would have a negative effect on executive functions, as these treatments would slow the child's development directly or indirectly by delaying the child's sense of assertiveness, with a perception of less support from the environment (Strang, Chen,

et al., 2021). Hormone therapy could be introduced at a low dose and increased in small doses over a longer period of time than for neurotypical people to slow body changes. Some young people, both autistic and neurotypical, also have high expectations of hormone therapy with magical beliefs that the treatment will bring about rapid and complete changes to their bodies. It is therefore necessary that the expected and possible undesirable effects of hormone treatments are explained to them, ensuring that they understand them, to prevent painful disillusionment. Strang et al. advise that, in the absence of a degree of urgency, an extended period of time should be allowed before any clinical decision is made to prepare the young person for the bodily and social changes associated with the transition (Strang, Meagher, et al., 2018). Some professionals advise a social transition to experience authentic gender before initiating gender-affirming medical treatment. For people with ASD and GD, Strang et al. note that social transition can either be a source of anxiety and added social difficulties or an easy step of the transition journey. Thus, the authors make no specific recommendations for social transition in these young people and advise that their feelings about it should be supported so as not to risk exacerbating social isolation (Strang, Meagher, et al., 2018). Moreover, for some autistic people, as for some neurotypical people, a social transition is not possible without the bodily changes permitted by medical treatment. This impossibility of social transitioning before taking a gender-affirming medical treatment does not therefore contraindicate the initiation of medical treatments (Strang, Meagher, et al., 2018; van Vlerken et al., 2020).

4. Discussion

Regarding the frequencies of autism in trans populations and of transidentity in people with autism, the results are quite heterogeneous but show an overrepresentation of this cooccurrence. However, some authors have questioned the frequencies found and the methodologies of studies conducted (Manjra & Masic, 2022; Thrower et al., 2020; Turban & van Schalkwyk, 2018a; van Schalkwyk, 2018). Indeed, most tests and scales used are screening tools and not diagnostic tools. Thus, question 110 of the CBCL does not, on its own, confirm transidentity, nor do the Social Responsiveness Scale (SRS) or Autism Quotient (AQ) diagnose autism (Thrower et al., 2020; Turban & van Schalkwyk, 2018a). Some studies only used self-declaration diagnosis and were therefore excluded from this review. In addition, some studies

have been conducted in clinical populations and others are community surveys. The age ranges of studied populations are also heterogenous. Turban therefore speculates that these findings may be artefact cooccurrences (Turban, 2018). Nevertheless, the overrepresentation of transidentity and autism cooccurrence is now widely recognised. A recent meta-analysis estimated the prevalence of ASD in transidentity people at 11% and found that the overall effect size of the difference in ASD traits between transidentity and control people was significant (g = 0.67, p <.001). The chances that there was not a link between ASD and transidentity were negligible. However, given the heterogeneity in the meta-analysis, the effect size needs further investigation (Kallitsounaki & Williams, 2022).

Many theories about the origin of this cooccurrence have been developed over the years. Some of these are controversial and questioned. Criticisms reported include the risk of a delay in appropriate care with a risk of an aggravation of GD and psychiatric cooccurrences. In addition, a significant number of articles use pathologising and cisnormative discourses (Shapira & Granek, 2019). However, these discriminating terms are gradually giving way to a more inclusive literature, testifying to a progressive collaboration between transgender people, autistic people and health professionals.

Regardless of the origin of the cooccurrence, the majority of authors now recognise the need for specialised transidentity care and the authorisation of gender-affirming medical treatments for autistic people on the same basis as for neurotypical people (Strang, Meagher, et al., 2018; Van Der Miesen et al., 2016; van Schalkwyk et al., 2015). Young autistic people find it difficult to access transgender-specialised care, often being discredited (Autistic Self Advocacy Network et al., 2016; Coleman-Smith et al., 2020; Strang, Powers, et al., 2018). A better understanding of this complex cooccurrence will lead to better psychological and physical health and overall functioning for individuals with this cooccurrence. The hypothesis that autistic transgender people forget their childhood memories in relation to the trauma caused by gender incongruence is interesting (Fisher, 2019; Violeta & Langer, 2017). Indeed, this may contribute to the difficulty these individuals have in narrating their gender experiences and therefore to the lack of credibility often reported. The greater gender variance found in autistic people, with a significant number of nonbinary people, may also contribute. Similarly, executive function disorders make it difficult to plan and organise social transition for these people, who may experience atypical transitions. All of these

characteristics lead to a greater risk of social rejection and discrimination. This population is therefore all the more at risk of harassment, particularly at school (Butler, 2017; Laflamme, 2020; Strang, Powers, et al., 2018). Courses on gender and sexuality aimed at all students could therefore be offered in conjunction with LGBTQIA+ associations (Butler, 2017). Autistic transgender people appear to have a more varied and fluid sexual orientation than neurotypical people and appear to have more similarities with the complexity of sexual orientation in autistic people.

It appears that a significant proportion of young autistic people become aware of their transidentity at puberty in connection with the body changes that occur (Ehrensaft, 2018). However, no studies have proven this hypothesis.

Screening for gender incongruence in autistic people and autism in transgender people is recommended (Strang, Meagher, et al., 2018). In terms of care recommendations for transgender autistic people, the continuation or establishment of specialised care for each of the two co-occurrences is necessary (Strang, Meagher, et al., 2018). In the care of autism, the reinforcement of gender stereotypes in specialised interventions should be avoided (Brooks, 2015; Strang, Van Der Miesen, et al., 2020). In the support of transidentity, the use of written or visual aids can help initiate discussions and reflections (Lehmann & Leavey, 2017). Close accompaniment should be offered during social and medical transitions, as these are particularly anxiety provoking for autistic people (Rudacille, 2016). The creation of specific psychoeducation groups for people with the co-occurrence seems to show good results (Strang, Knauss, et al., 2020). However, these groups are very specialised and difficult to set up in most care structures.

A very small proportion of transgender young people with autism currently use fertility preservation. However, the few studies on this topic show a demand from these young people to be informed, and a significant proportion of these young people seem to consider preservation (Strang, Jarin, et al., 2018).

There are several limitations to the results observed above. Given the rarity of the cooccurrence in the general population, many studies include small numbers of participants, leading to a lack of power in results. Some studies did not include a control group (Turban & van Schalkwyk, 2018b). A number of studies are based on clinical populations, followed up in

specialised consultations. These inclusion groups do not represent all the gender variance observable in autistic people (Glidden et al., 2016). Other studies have used internet recruitment. The diagnosis of autism is then self-declared without verification by the authors during the study. Furthermore, in studies adopting this methodology, the sex ratio of autistic people included is often not representative of the recognised sex ratio for autism. Indeed, the recognised sex ratio for autism is 4 males to 1 female, whereas in these studies, a majority or half of those included are assigned female at birth. This could be because those assigned female at birth would more often agree to participate in studies. Finally, many studies have excluded people with intellectual disabilities or people with severe verbal communication disorders. It would be interesting to study the development of gender identity in these people, as they are probably even less likely to be helped with transidentity than the general population.

The frequency and severity of other psychiatric cooccurrences has been little studied in transgender autistic people even though this cooccurrence is now recognised and this population is considered to be at greater risk than neurotypical transgender people.

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1 FIGURE CAPTION

2 **Figure 1. Flow chart**

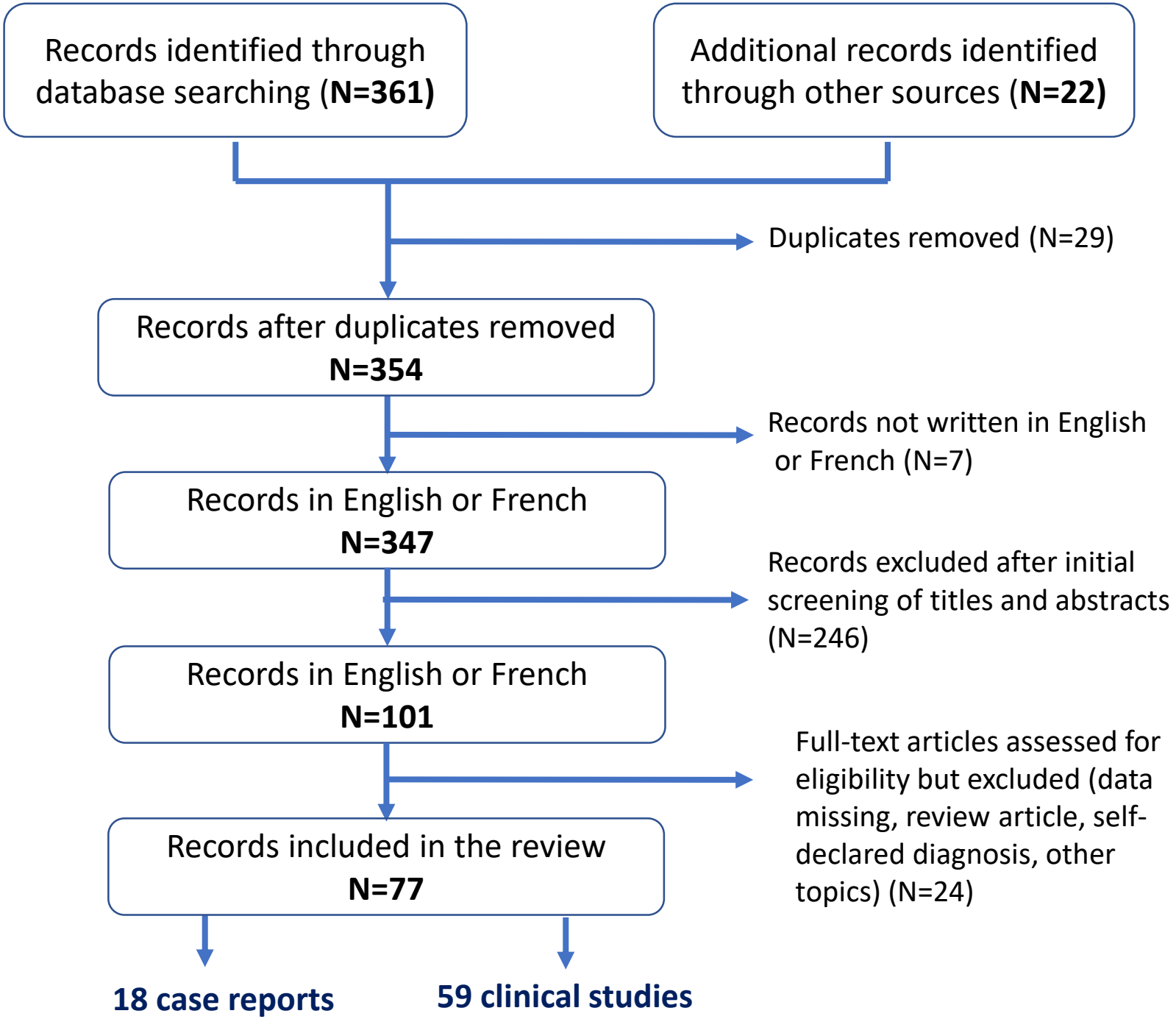
Records identified through database searching (N=361)
Additional records identified through other sources (N=22)
Duplicates removed (N=29)
Records after duplicates removed N=354
Records not written in English or French (N=7)
Records in English or French N=347
Records excluded after initial screening of titles and abstracts (N=246)
Records in English or French N=101
Full-text articles assessed for eligibility but excluded (data missing, review article, self-declared diagnosis, other topics) (N=24)
Records included in the review N=77
18 case reports
59 clinical studies

Table 1 – Frequency of autistic traits and autism in transgender people

Authors	Evaluation methods	Study group	Control group	Frequencies
Children and Adolescents				
De Vries et al. 2010 Netherlands	Gender dysphoria (GD) : DSM-IV-TR criteria Autistic spectrum disorder (ASD) : DISCO-10	108 prepubertal children (mean age = 8,06 ± 1,82 years) and 96 adolescents (mean age = 13,92 ± 2,29 years)	None Comparison with ASD prevalences measured from 0,6 to 1% of general population of studies of Fombonne 2005 and Baird et al. 2006	Total : 7,8% Children : 6,4% Adolescents : 9,4%
Skagerberg et al. 2015 United Kingdom	GD : specialised care ; ASD : SRS filled by parents	166 participants including 104 assigned female at birth (AFAB) and 62 assigned male (AMAB) (mean age = 14,26 ± 2,68 years ; age range = 5 to 18 years)	None Comparison with the results from the standardisation scale	Autistic traits scores with the SRS : 27,1% light to mild ; 27,1% severe No significant difference between AFAB and AMAB
Kaltiala-Heino et al. 2015 Finland	Gender incongruence : specialised care ; ASD : Retrospective (ICD-10 code)	41 young AFAB (mean age = 16,66 ± 1,07 years) ; 6 young AMAB (mean age = 16,04 ± 0,57 years)	None	26%
Shumer et al. 2016 United States of America	GD : specialised care ; ASD : ASDS	39 participants (mean age = 15,8 years ; age range = 5 to 18 years)	None	23%
Holt et al. 2016 United Kingdom	GD : specialised care ; ASD : retrospective	218 participants including 79 AMAB ans 129 AFAB (mean age = 14 ± 3,08 years ; age range = 5 to 17 years)	None	12,2% of children (≤ 11 years) and 13,6% of adolescents between 12 and 18 years Including 18,5% in AMAB participants and 10,2% in AFAB participants
Nahata et al. 2017	GD : retrospective (ICD-9 or 10) ; ASD : retrospective	79 participants with an endocrinology follow-up for hormones including 28 trans	None	Total : 6,3% ; trans men : 5,9% ; trans women : 7,1%

United States of America		women and 51 trans men (mean age = 15 years ; age range = 9 to 18 years)		
Van der Miesen et al. 2018 Netherlands	GD : specialised care ; ASD : CSBQ	490 participants (mean age = 11,1 ± 3,73 years) including 248 AMAB and 242 AFAB	2507 participants who never received a diagnostic of ASD (mean age = 10,1 years ; SD = 3,73) including 1248 boys et 1259 girls	14,5% of ASD in the study group vs 3,5% in the control group
Kaltiala-Heino et al. 2019 Finland	GD : specialised care ; ASD : Retrospective	99 participants including 84 AFAB and 15 AMAB (mean age = 16,9 ± 0,9 years)	None	Young AMAB : 13,3% ; AFAB : 17,9%
Mahfouda et al. 2019 Australia	GD : specialised care ; ASD : SRS-2 filled by parents	104 participants (mean age = 14,62 ± 1,72 years) including 25 AMAB and 79 AFAB	None	9,6% have a diagnostic of ASD before the study Results at SRS-2 : 22,1% have a severe score, in favor of ASD
Hilton et al. 2022 Australia	GD : UGDS ; ASD : AQ-50	64 participants (age range = 8 to 16 years ; mean age = 12,91 ± 1,90 years)	None	10,94% of participants have scores in favor of a ASD at the AQ-50
Lagrange et al. 2022 France	Gender incongruency : ICD-11 ; ASD : DSM-5 ; ADI-R	239 participants (age range = 3,22 – 20,69 years ; mean age = 14,50 years ; SD = 3,16)	None	9% of participants have ASD
Adults				
Jones et al. 2012 United Kingdom	Transidentity : specialised care according to the DSM-IV; ASD : AQ-50	61 trans men (mean age = 34 years ; age range = 19 to 52,7 years) and 198 trans women (mean age = 45,1 years ; age range = 16 to 75 years)	76 men and 98 women (mean age = 37 years ; age range = 18,1 to 60 years)	29,6% of trans men have a mean to a severe score and 5% of trans men vs 6,3% of men and 2% of cis women

Pasterski et al. 2014 United Kingdom	GD : specialised care ; ASD : AQ-50	63 trans women (mean age = 45,47 years) and 28 trans women (mean age = 27,38)	None	Scores in favor of ASD at the AQ : Total = 5,5% Trans men = 7,1% Trans women = 4,8%
Kristensen et Broome 2015 United Kingdom	Transidentity : self-declaration ; ASD : self-declaration and AQ-10	422 participants (age range = 18 to 75 years)	None	13% in self-declaration including 17% for AFAB and 10% for AMAB Scores in favor of ASD at the AQ : 39%
Heylens et al. 2018 Belgium	GD : specialised care ; UGDS ; ASD : retrospective according to the DSM-IV ; SRS-A ; AQ-50	63 participants including 33 AMAB (mean age = 31,3 years ± 14,7) and 30 AFAB (mean age = 22,7 years ± 6,5) 532 people included in retrospective study including 351 AMAB et 181 AFAB	None	Scores in favor of ASD at the SRS-A : 27,11% including 31,25% in AMAB and 22,22% in AFAB Scores in favor of ASD at the AQ : 4,84% Frequency of ASD in retrospective study : 6%
Warrier et al. 2020 United Kingdom	Transidentity : self-declaration ; ASD : self-declaration ; AQ-10 ; EQ-10 ; SQ-10 ; SPQ-10	2811	511 829	Frequencies of self-declaration : 668 ASD (23,7%) in trans vs 27 251 in cis (5,3%)

GD : Gender dysphoria ; DSM-IV-TR or 5 : Diagnostic and Statistical Manual of Mental Disorders, 4th or 5th versions, text revised ; ASD : autism spectrum disorder ; DISCO-10 : Diagnostic Interview for Social and Communication Disorders, 10th version ; SRS -2, -A : Social Responsiveness Scale, first or second versions, A for adults version ; AFAB : assigned female at birth ; AMAB : assigned male at birth ; ICD-9, 10 or 11 : International Classification of Diseases, 9th, 10th or 11th versions ; ASDS : Asperger Syndrome Diagnostic Scale ; CSBQ : Children's Social Behavior Questionnaire ; SD : standard deviation ; UGDS : Utrecht Gender Dysphoria Scale ; AQ-10 or -50 : Autism Quotient ; ADI-R : Autism Diagnostic Interview, revised ; EQ-10 : Empathy Quotient ; SQ-10 : Systemizing Quotient ; SPQ-10 : Sensory Perception Quotient

Table 2 - Frequency of gender incongruency and GD in autistic people

Authors	Study group	Control group	Frequency
Adults (GIDYQ Questionnaire)			
George et Stokes 2018 Australia	310 (mean age = 31,01 years ± 11,37) including 90 AMAB and 219 AFAB and 1 intersex	261 (mean age = 30, 20 years ± 11,92) including 103 AMAB and 158 AFAB	7,8% transgender women and 2,3% transgender men in the ASD group vs 3,9% and respectively 0,6% in the study group; 1,1% of genderqueer in AMAB and 12% in AFAB with ASD vs 0% and respectively 5,1% in the control group
Adults (Self-declaration of lived gender)			
Kalafarski 2010 United States of America	29 participants ; age range between 20 and 30 years (mean age = 25,38 years)	None	31% of gender incongruency
George 2016 Australia	109 including 41 AMAB (mean age = 33 years ± 12,61) and 68 AFAB (mean age = 28,53 years ± 9,71)	69 including 36 AMAB (mean age = 29,64 years ± 10,37) and 34 AFAB (mean age = 29,88 years ± 11,61)	14,6% of transgender women and 1,4% of transgender men having ASD vs 3% of women and 2,9% of transgender neurotypical men 22% of AMAB and 34,3% of AFAB having ASD are non-binary vs respectively 3% and 8,8% of neurotypical people
Children and Adolescents (Question 110 of CBCL)			
Strang et al. 2014 United States of America	123 AMAB and 24 AFAB	104 AMAB and 61 AFAB	5,4% of ASD group « wish to be of the opposite sex » according to parents vs 0,7% of group control or 7,59 times more
Janssen et al. 2016 United States of America	492 participants (mean age = 8,92 years ± 2,7; age range = 3 to 17 years) including 409 AMAB and 83 AFAB	Comparison with participants of standardisation of the scale (1605 participants including 851 AMAB and 754 AFAB, mean age = 11,74 years ± 3,44 ; age range from 6 to 18 years)	5,1% « wish to be of the opposite sex » according to parents vs 0,7% of control group or 7,76 times more
May et al. 2016	176 participants including 33 AFAB and 136 AMAB; age range from 6 to 18 years	Comparison with participants of standardisation of the scale (1605 participants including 851 AMAB	4% « wish to be of the opposite sex » according to parents vs 0,7% of control group

Australia		and 754 AFAB, mean age = 11,74 years ± 3,44 ; age range from 6 to 18 years)	
Children and Adolescents (Retrospective – ICD-9 Diagnostic)			
Hisle-Gorman et al. 2019 United States of America	48 762 (mean age = 8,83 years ± 1,3) including 80% AMAB	292 572 (mean age = 8,83 years ± 1,3) including 80% AMAB	0,07% of participants with ASD have a GD vs 0,01% of control group or 4 times more
Adolescents and adults (Question 110 of CBCL)			
Van der Miesen et al. 2018 Netherlands	573 adolescents (mean age = 15,98 years ± 1,85) including 104 AFAB and 469 AMAB; 807 adults (mean age = 32,14 years ± 12,86) including 191 AFAB and 616 AMAB	1016 adolescents (521 AFAB and 495 AMAB, age range 11 to 18 years) and 846 adults (mean age= 29,9 years ± 9,5 ; 465 AFAB and 381 AMAB) from scales standardisation samples	6,5% of adolescents « wish to be of the opposite sex » vs 3,1% of control group or 2,12 times more And 11,4% of adults of study group vs 5% of control group or 2,46 times more
Adolescents and adults (Self-declaration of lived gender)			
Dewinter et al. 2017 Netherlands	675 including 326 AMAB (mean age= 46,44 years ± 14 ; age range 15-80 years) and 349 AFAB (mean age= 40,21 years ± 12,4 ; age range = 16-75 years)	None	0,9% transgender 22% AFAB and 8% AMAB with ASD are gender variant
Walsh et al. 2018 Netherlands	669 participants including 322 AMAB and 347 AFAB (mean age = 44,67 years ± 12,63)	None	3,74% of transgender women and 11,2% of transgender men

GIDYQ : Gender Identity / Gender Dysphoria Questionnaire ; AMAB : assigned male at birth ; AFAB : assigned female at birth ; ASD : autism spectrum disorder ; CBCL : Child Behavior Checklist ; ICD-9 : International Classification of Diseases, 9th version ; GD : gender dysphoria

Table 3 - Hypothesis explicating the co-occurrence of transidentities and autism

Authors	Hypothesis	Criticism
Biological hypotheses		
Vanderlaan et al. 2015 Canada	A high birth weight (BW) might be the factor favoring the co-occurrence	Although the results are significant, with a mean difference of 11.5% in BW between the study and control groups, the measured BW of the children remain normal BW. Furthermore, BW is negatively correlated with fetal testosterone levels. Thus, high BW would mean low fetal testosterone exposure. This is in contradiction with other hypotheses on ASD such as Baron Cohen's Extreme Male Brain Theory.
Social hypotheses		
Gallucci et al. 2005 Etas-Unis	Transidentity would allow people with ASD to avoid conventional sexual relationships, which are a source of stress due to their difficulties in social interactions	People do not choose their gender identity
Tateno et al. 2008 Japan	Transidentity linked to a history of same-gender peer harassment in assigned male children with ASD	Harassment in trans people is more often found in adolescence, perhaps related to difficulties in social interactions typical of ASD
Shumer et al. 2015 United States of America	Given the positive correlation between the presence of autistic traits in mothers and gender non-conformity of their child, the authors assume that early interactions between a mother with autistic traits and her child promote gender non-conformity.	The authors do not look for a positive correlation between maternal autistic traits in the child and the presence of gender non-conformity. This correlation was not found with the fathers, questioning either the quality of father-child interactions or the replicability of these results in a larger sample
Psychological hypotheses		
Landén et Rasmussen 1997 Sweden	Transidentity in a person with ASD would be a paraphilia resulting from difficulties in social interactions	Transidentites are not sexual behaviors
Williams 1996 (United States of America) ; Mukaddes 2002 (Turkey) ; Tateno et al. 2008 (Japan) ;	Transidentity would be a restricted interest in activities or clothing typically preferred by peers of the opposite gender, sometimes motivated by sensory particularities in these children.	In 2018, Van der Miesen et al. investigate the presence of autistic traits among children and adolescents with GD, compared to a group with ASD and a control group with neither GD nor ASD. Using the Children's Social Behavior Questionnaire (CSBQ) scale, the authors did not find more restricted interests in the group with GD compared to the control group

Parkinson 2016 (Australia)		
Landén et Rasmussen 1997 (Sweden) ; Perera 2003 (Sri Lanka) ; Gallucci et al. 2005 (United States of America) ; Parkinson 2014 (Australia) ; Vanderlaan et al. 2015 (Canada) ; Zucker et al. 2017 (Canada)	Transidentity would be linked to obsessional preocupations due to ASD	Vanderlaan et al. in 2015 and Zucker et al. in 2017 tested this hypothesis. Both studies report inconsistent results, partially significant in the study by Vanderlaan et al. Children with GD have more stereotypical concerns than children who have psychiatric disorders but not more than children with psychiatric disorders. Their interests are more related to gender in the study by Zucker et al. but not in the study by Vanderlaan et al. Possible interpretation bias: the appearance of behaviours and activities usually preferred by people of the opposite gender in children with GD would be noticed and judged as intrusive interests by those around them, whereas these same behaviours and activities would not have been considered as such for cisgender children. For example, a boy playing with dolls repeatedly with a little girl will be noticed by someone, who will consider this activity atypical and compulsive for the boy but not for the girl.
Akgül et al. 2018 Turkey	GD would be favored by executive functions disorders in ASD	Executive functions disorders are not systematic in ASD
Jack 2012 United States of America	Language disorders in ASD lead to difficulty in identifying with gender roles. Poor childhood integration of the words "boy" and "girl" and related concepts	Language disorders are not systematic in ASD

BW : birth weight ; ASD : autism spectrum disorder ; GD : gender dysphoria ; CSBQ : Children's Social Behavior Questionnaire

Table 4 –Publications reporting clinical observations of the co-occurrence of transidentity and autism

Authors, year of publication	Subjects presented, caractéristics of transidentity and autism	Co-occurrences	Hypothesis, conclusions
In children			
Williams et al., 1996 United States of America	Two subjects : Transgender girl, 5 years old. GD from 4 years old. ASD diagnostic at 4 years. Transgender girl, 3 years and 7 months old. GD from 3 years old. ASD diagnostic at 3 years	ADHD, speech delay, muscular hypotonia, inguinal hernia Speech delay, muscular hypotonia	Transidentity would derived from restricted interests of ASD
Mukaddes, 2002 Turkey	Two subjects : Transgender girl, 10 years old. GD from 6 years old. ASD diagnostic at 5 years old Transgender girl, 7 years old. GD from 4 years old. ASD diagnostic at 3 years	Speech delay, Chiari malformation Delay of speech	Transidentity would derived from restricted interests of ASD
Tateno et al., 2008 Japan	Transgender girl, 9 years old. GD from 7 years old. ASD diagnostic at 5 ans	None	Developpement of a GD would be linked to a history of peer harassment
Tateno et al., 2015 Japan	Same subject, aged 16 years old, regression of cross sex behaviors	None	Cross-sex behaviours would have regressed as male behaviours were required
In adolescents			
Landén et Rasmussen, 1997 Sweden	Trans boy, 14 years old. GD from 8 years. ASD diagnostic around 6 years	Oral speech delay, Obsessional compulsive disorder (OCD)	Transidentity would be a paraphilia or related to obsessive-compulsive disorder in people with ASD

Perera et al., 2003 Sri Lanka	Transgender boy, 20 years old. GD from 14 years. ASD diagnostic at 6 years.	OCD	GD would be induced by OCD linked to ASD
Parkinson et al., 2014 Australia	Two subjects : Young assigned boy at birth, aged 25 years. GD from 21 years, regression of transidentity after 3 years of therapy Young assigned boy at birth, aged 19 years. GD from 9 years. Regression of transidentity after 2 years of therapy	None None	Transidentity would be a transient limited interest in people with ASD
Janssen, 2018 United States of America	Transgender girl, 13 years old, GD from 3 years	Intellectual deficiency, bipolar disorder	Frequent co-occurrence. No causal link between the two co-occurrences
Selinger, 2018 United States of America	Boy, 10 years old expressing gender incongruency from 8 to 10 years with necessity to explore genders. ASD diagnostic at 2 years	Prematurity at 29 weeks of amenorrhea	Social responses from family influence the exploration of gender in children with ASD. Utilisation of symbolic play
Van Vlerken, 2020 Netherlands	Trans girl, 16 years old, GD from 12 years, ASD diagnostic at 8 years	None	Difficulties in understanding their gender identity for some young people with ASD so support for exploration
Zupanic et al., 2021 Slovenia	Trans man, 16 years and half Coming in of transidentity at 15 years while discussing with a trans person. Presence of GD for his breast	Oral speech delay and articulatory disorder Severe depressive episode, social anxiety	Recommend extended companionship to support the young person in exploring their gender due to the cognitive rigidity associated with autism. Support for follow-up and care planning. Autism is not a contraindication to gender affirming treatments

	ASD diagnostic after first consultations for transidentity	Obesity since early childhood, post-pubertal hyperlipidemia	
In adults			
Gallucci et al., 2005 United States of America	Transgender woman, 41 years old. GD from 12 years. ASD diagnostic at 41 years.	Severe recurrent depressive episodes, obsessive-compulsive disorder	GD would be linked to OCD frequently associated with ASD
Kraemer et al., 2005 Switzerland	Transgender man, 35 years old. GD since childhood	None	GD in individuals assigned female at birth is secondary to ASD as it induces typically male characteristics and thus gender incongruency
Lemaire et al., 2014 France	Transgender man, 23 years. GD from 7 years. ASD diagnostic at 5 years.	Speech delay, learning disabilities, severe recurrent depressive episodes	People with ASD feel different from those around them and conclude that they were misassigned at birth
Jacobs et al., 2014 United States of America	Two subjects : Transgender woman, 29 years. GD from 28 years. No diagnostic evaluation of ASD but strong suspicion Transgender woman, 18 years. GD since puberty. No diagnostic evaluation of ASD but strong suspicion	Social anxiety Language disorder, anxiety disorder	ASD-related rigidity causes more severe GD in people with ASD compared to neurotypical people because of gender binary conception
Baker et Shweikh, 2016 United Kingdom	Transgender woman, 52 years, GD from 7 years. Diagnostic of Asperger's syndrom just before 50 years	Language Disorder Histrionic and Dependent Personality Disorder	Delayed diagnosis of ASD related to personality disorders co-occurring with GD

Violeta et Langer, 2017 United States of America	Transgender woman, unspecified age, cross-sex behaviours from age 12. Delayed care for GD. Age at ASD diagnosis not specified	None	Repeated childhood trauma related to difficulties in adjusting parental social responses to transidentity. Emergence of dissociative defence strategies. Possible change in sexual orientation during authentic gender affirmation
Cain et Velasco, 2020 Etats-Unis	Non-binary person, assigned girl at birth, 33 years old, gender incongruency in childhood, identifies as transgender in adolescence, then non-binary in adulthood. Diagnosis of ASD at 8 years	Obesity, leading to imbalances in testosterone doses between the beginning and end of the dose and less access to reimbursement	Transgender people with ASD sometimes find it difficult to have their claims understood

GD : gender dysphoria ; ASD : autism spectrum disorder ; ADHD : attention deficit hyperactivity disorder ; OCD : Obsessionnal Compulsive Didorder

Lexic

Identity	From the Latin "identitas" meaning "the same". Refers to the representation of oneself in relation to a group of people identified as similar. There are many identities: national, ethnic, religious... Gender identity is part of one's identity
Gender	Refers to the cultural and social differences induced by sex in individuals. Used by John Money in 1955 to differentiate between sex, which is biological in origin, and gender, which is social in origin.
Gender Identiy	The ability for a person to define themselves as male, female, non-binary, agender, gender fluid or other. Concept introduced by Robert Stoller to refer to a person's sense of gender. Can change over the course of one's life.
Gender Identification	Psychological affiliation to a gender group.
Gender Roles	A set of behaviours, attitudes and expectations described for a man and a woman respectively. This notion assumes a binarity of gender and attaches certain stereotypical characteristics to men and women. Gender roles evolve over time and culture and may therefore be different in different parts of the world and at different times
Gender Expression	The way in which gender roles are integrated and expressed to different degrees in a person.
Gender Consistency	Requires the child to understand that gender does not change when physical changes, such as hairstyle or clothing, or behavioural changes occur on a temporary basis
Gender Non-conformity	An individual's gender identity or expression showing variations from the cultural norms attributed to a certain gender (3). Not everyone who is gender non-conforming necessarily experiences GD (4)
Gender Incongruency	A term referring to the experience of a person whose assigned sex at birth does not align with their gender identity
Gender Dysphoria (GD)	A term proposed by Fisk in 1973 to describe in a neutral way the condition experienced by transgender people (5). Involves significant suffering experienced by the person as a result of the mismatch between their body and their authentic gender identity. Currently used as a diagnostic category in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5)
Cisgender	Means that a person's authentic gender identity is congruent with the gender assigned to them at birth
Transgender	Means that a person's authentic gender identity is different from the gender assigned to them at birth. The term "**trans**" is an abbreviation of the term "transgender". Thus, a **transgender man** is a person who was assigned female at birth and has a male gender identity. A **transgender woman** is a person who was assigned male at birth and has a female gender identity
Transsexualism	Should no longer be used. Rejected by trans communities and the majority of health professionals as referring to the medical, social and legal pressures transgender people faced to undergo hormonal and surgical transitions, to gain societal recognition of their authentic gender identity and to gain access to an otherwise prohibited change in their marital status
Non-binarity	Gender identity that does not fit into binary concepts of gender. A non-binary person may define themselves as both male and female, or neither male nor female.

Queer, gender fluid	More general, English-speaking terms, bringing the notion that gender is not a binary construct and that it can change over the course of a lifetime.
Transphobia	Refers to all forms of social rejection, discrimination or verbal or physical violences directed against transgender people

GD : gender dysphoria ; DSM-5 : Diagnostic and Statistical Manual of Mental Disorders, 5th version