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GENDER IDENTITY AND SEXUAL ORIENTATION OF PEOPLE WITH AUTISM SPECTRUM DISORDER: A SYSTEMATIC REVIEW

Identidad de género y orientación sexual de las personas con Trastorno del Espectro del Autismo: una revisión sistemática

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ABSTRACT: There has been growing interest about gender identity and sexual orientation in people with autism spectrum disorder. This systematic review analyzes 18 studies conducted since 2016 that met the inclusion criteria. The aim was to gather evidence of gender identity, gender dysphoria, and sexual orientation in the ASD population. The results indicate an increased prevalence of non-conforming gender identity and gender dysphoria in people with ASD. There was also evidence of greater prevalence of non-heterosexual orientation in people with ASD than people without ASD. These results were particularly found in women with ASD. However, more studies are needed, especially about women, children and adolescents, to ensure that there are suitable support and resources to meet the needs of this population.

KEYWORDS: Autism spectrum disorder; gender dysphoria; transgender; transexual; sexual orientation.

RESUMEN: En los últimos años ha surgido un creciente interés en relación con la identidad de género y la orientación sexual de las personas con trastorno del espectro del autismo (TEA). La presente revisión sistemática analiza un total de 18 estudios, publicados a partir de 2016, con la finalidad de obtener evidencias acerca de la identidad y disforia de género, y la orientación sexual en la población con TEA. Los resultados indicaron que existe una mayor prevalencia de identidad de género no conforme y de disforia de género en la población con TEA. Se encontró una mayor prevalencia de orientación no heterosexual en las personas con TEA en comparación con la población sin TEA. Estos resultados se encuentran preferentemente en las mujeres con TEA. No obstante, es necesario disponer de más y mejores evidencias sobre esta temática, especialmente en mujeres, y en las etapas de la niñez y la adolescencia, con el fin de implementar apoyos y recursos adecuados para dar respuesta a las necesidades de estas personas.

PALABRAS CLAVE: Trastorno del espectro del autismo; disforia de género; transgénero; transexual; orientación sexual.

1. Introduction

Autism Spectrum Disorder (ASD) is any one of a group of neurodevelopmental disorders characterized by difficulties in communication and reciprocal social interaction, restricted interests and repetitive activities, and sensory and perceptual disorders (American Psychiatric Association [APA], 2013). In this regard, people with ASD exhibit difficulty in developing feelings of belonging to or identifying with groups. Deficits have also been found in autobiographical memory. These two aspects affect the formation of self-concept and gender identity

(Cooper *et al.*, 2018) as they affect the understanding of social norms and therefore gender roles, understood as a set of socially established norms for each gender (Herrera, 2000).

The term gender identity refers to the inherent, internal sensation —that may not be visible to others— of feeling that one is a man, woman, or alternative gender (e.g., gender queer, non-conforming, neutral) that may or may not correspond to biological sex or the sex assigned at birth (APA, 2015). Gender identity, the awareness of one's own gender and the gender of others, is shaped in the first few years of life. At six or seven years of age it is generally considered to be stable, although it develops throughout life based on a person's social experiences (López, 2018).

People with ASD exhibit less distinctive behaviours associated with gender, especially during infancy. To put it another way, there are behaviourally fewer differences between boys and girls with ASD than in the population without ASD (Tanweer *et al.*, 2010). In addition, some studies have indicated that people with ASD are more likely to be transsexual or suffer gender dysphoria (Glidden *et al.*, 2016).

Transsexuality refers to people whose gender identity is different to their biological sex. Often, trans people modify or want to modify their bodies using hormones, surgery, and other methods so that they are in line with their gender identity, leading to a change of their biological sex (Hurtado-Murillo, 2015). Transsexuality may end up leading to what is called *gender dysphoria*. This term refers to the psychological distress or unease arising from the incongruence between gender identity and biological sex (Strang *et al.*, 2018). Estimates of its prevalence in the general population vary widely. According to Hurtado-Murillo (2015), considering epidemiological data collected in different countries, the ratio of transsexuality has been estimated to be 4:1 for female transsexuality and 2:1 for male. However, in contrast to what is seen in the general population, there seems to be a greater prevalence of gender dysphoria in women with ASD (Stagg and Vincent, 2019), although it is important to note that the number of studies into gender identity in women with ASD is so far very small.

In terms of the co-occurrence of ASD and gender dysphoria, there are studies indicating that women do not feel as though they identify with society's construct of femininity, and a masculine role predominates (Bejerot and Erikson, 2014). There are also studies which have reported people with ASD as being more likely to undergo gender transition, with hardly any indicators of dissatisfaction leading to abandoning the transition or regret after surgery (Glidden *et al.*, 2016). It is during adolescence that sexual orientation is generally established (Martínez *et al.*, 2020), and just as in other important areas of development, adolescents can exhibit various states as they form their sexual identities. So, in much the same way that gender identity does not have to be set in stone in this period, many people do not discover their sexual orientation until adulthood, and this could change over their lives. Sexual orientation refers to a lasting pattern of emotional, romantic, or sexual attraction to men, women, or both (APA, 2012). It is a construct made up of three

dimensions: sexual identity, sexual behaviour, and sexual attraction (Georges y Stokes, 2018). Sexual identity is the label used by individuals to describe their own sexuality (i.e., heterosexuality, homosexuality, bisexuality, pansexuality, asexuality, and *queer*, among others). Sexual behaviour refers to whether one's partner is the same gender or not. Lastly, sexual attraction refers to the level of sexual desire towards another person (Legate and Rogge, 2019).

According to Hervas and Pont (2020), the first studies about the sexual orientation of people with ASD suggested that the sexual orientation they presented was asexual, they did not present sexual attraction towards anyone, as they had difficulties developing stable heterosexual relationships or forming families. However, more recent studies have shown that most people with ASD have the same affective and sexual needs as people without ASD (Hervas and Pont, 2020; Kellaher, 2015) and some studies indicate that non-heterosexual orientation is more common (Glidden *et al.*, 2016; Hurst, 2016).

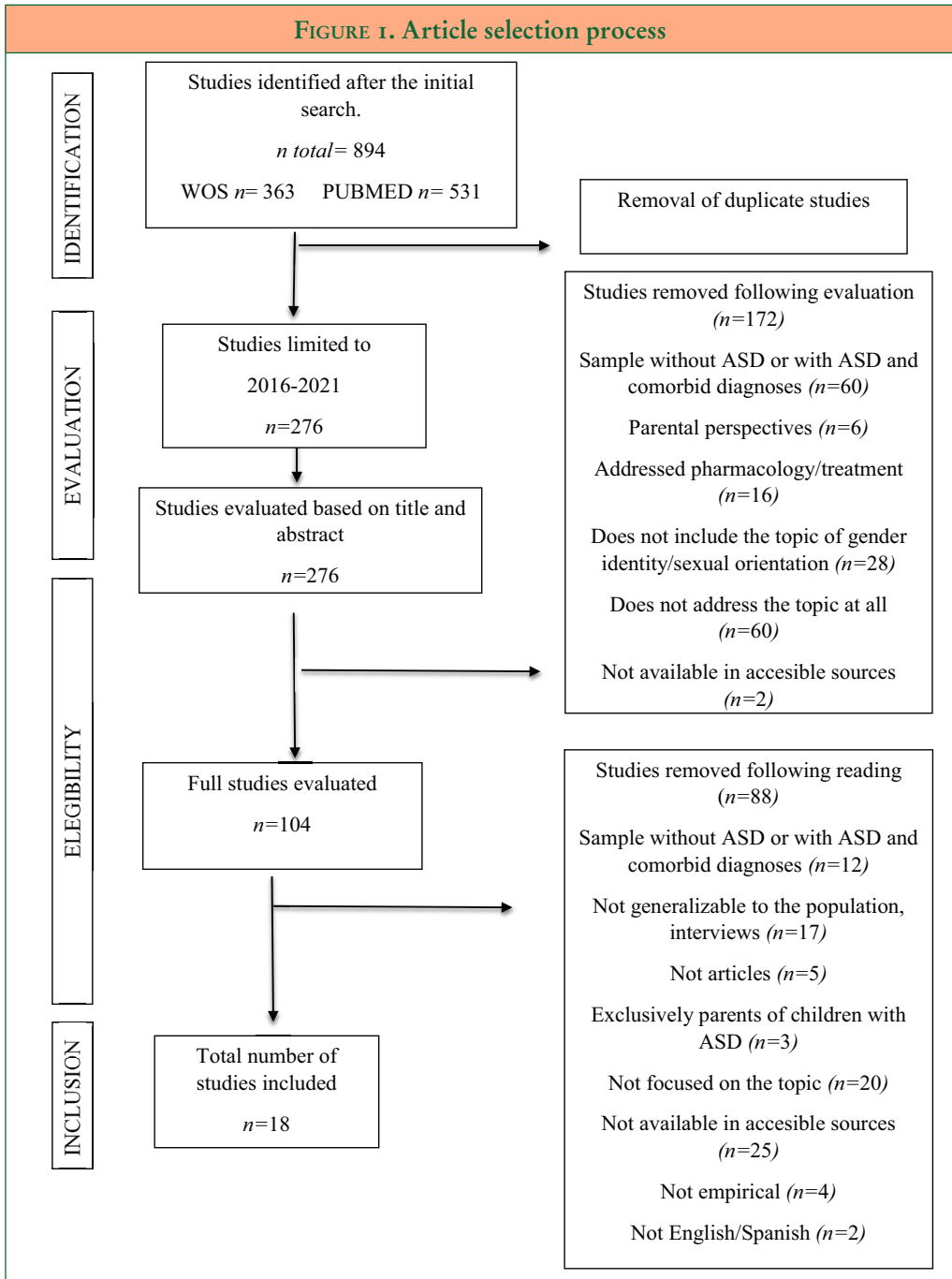
Based on the above, and given that there are no comprehensive, up to date reviews on this subject, the general objective of the present study was to understand the current state of the issue of gender identity and sexual orientation in people with ASD. To that end, a systematic review was performed to answer the following research questions. Is non-conformity of gender more common in people with ASD and what factors are usually associated with it according to the literature? Is non-heterosexual orientation more common in people with ASD and what factors does the literature associate with this orientation?

2. Method

The systematic review was performed in accordance with the PRISMA declaration (Page *et al.*, 2021). The search was carried out on PubMed and the Web of Science (WOS) databases. To properly define the results, two parallel searches were performed. One, for ASD and sexual orientation used "(autism spectrum disorder OR autism OR Asperger's syndrome OR Asperger) AND (sexual orientation OR sexual minority OR lgb OR gay OR lesbian OR bisexual OR transsexualism)". The other, for ASD and gender dysphoria, used "(autism spectrum disorder OR autism OR Asperger) AND (gender dysphoria OR transgender OR gender nonconforming)". The same search strategy was repeated with those descriptors in Spanish.

As Figure 1 shows, the first search (ASD and sexual orientation) produced 510 articles, the second (ASD and gender dysphoria) produced 273 articles. Given the recent interest in the topic, the search was limited to between 2016 and 2022. After removing duplicates, a preliminary review —title and abstract— was made of 276 articles. The subsequent step was a review of the full text of the remaining articles ($n = 104$). During the process, inclusion criteria were considered, which were that the studies had to be empirical and published in English or in Spanish. Articles were discarded if they did not focus on people with ASD or used samples with ASD and other comorbid diagnoses (ADHD). In addition, articles which were not available in

FIGURE 1. Article selection process



accessible sources or which were in languages other than English or Spanish were also discarded. Non-empirical studies and interview-based studies were also discarded, as were studies whose results could not be extrapolated to the population. A total of 18 studies made up the final sample.

3. Results

3.1. Frequency of gender non-conformity in people with ASD

The studies related to gender non-conformity in people with ASD had a variety of different objectives (Table 1). Some studies aimed to test the relationship between ASD or autistic traits and transgender and non-binary gender identities, and more commonly, gender dysphoria. The results of those studies indicate that people with ASD or with more autistic traits have a preference towards transgender or non-binary identities rather than towards binary identities or identities consistent with their biological or birth-assigned gender, particularly women with ASD.

Firstly, the study by Cooper *et al.*, (2018) found that people with ASD were more likely to present gender incongruity than their peers in a control group, especially women ($p < .001$). In the study by Stagg and Vincent (2019), 14 % of the participants in the “transgender and non-binary” group had diagnoses of ASD,

TABLE 1. Characteristics of studies about gender non-conformity in people with ASD			
Author (year)	N Participants	Age	Results
Cooper <i>et al.</i> , (2018)	F with ASD = 101 M with ASD = 118 F with TD = 153 M with TD = 114	16-80	People with ASD were more likely to have gender incongruency, especially women, and were more likely to undergo gender transition, and have low affiliation and negative feelings towards a gender group. Women with ASD presented a wider variety of gender identities than men.
Cooper <i>et al.</i> , (2021)	F with ASD = 8 M with ASD = 7 Non-binary with ASD = 6	18-51	The sample experienced distress because gender diversity and neurodiversity were not always accepted. They described barriers to access for medical treatment in response to their gender needs.

TABLE I. Characteristics of studies about gender non-conformity in people with ASD			
Author (year)	N Participants	Age	Results
Dewinter <i>et al.</i> , (2017)	ASD group = 675 326 M, 349 F TD group = 8064 3927 M, 4137 F	15-80 Mean age 40	22 % of women and 8 % of men with ASD had feelings of gender non-conformity. More variety in sexual orientation in the group with ASD: 1/7 women and 1/20 men indicated attraction to the same sex.
George and Stokes (2018a)	ASD Group = 90 M, 219 F TD Group = 103 M, 158 F	Mean 30	Gender dysphoria worsened mental health if it went together with a diagnosis of ASD. Being in a minority sexual group did not worsen mental health of the ASD group, but did have a negative impact in the TD group.
Kallitsounaki and Williams (2020)	101 participants: 50 F, 51 M (ASD: 13, non-ASD: 88)	22-70 mean 36.93	More autistic traits, more memories of crossed gender in infancy and more current characteristics of gender dysphoria. The processing of TM moderates the relation between ASD traits and gender dysphoria.
Kallitsounaki <i>et al.</i> , (2020)	126 participants, 97 F, 29 M	18-45	Capacity for TM moderates the relationship between autistic traits and gender dysphoria. People with ASD present low ability in TM and more feelings of gender dysphoria.
May <i>et al.</i> , (2017)	ASD group = 94 (21 F, 73 M). TD group = 3454 (1675 F, 1685 M)	14-15	High proportion of non-heterosexual attraction in women with ASD. There was no significant difference between men with ASD and TD men.

TABLE I. Characteristics of studies about gender non-conformity in people with ASD			
Author (year)	N Participants	Age	Results
Pecora <i>et al.</i> , (2020)	ASD group = 134 DT group = 161 All F	Mean 26-22	Women with ASD were more likely to identify as transgender and non-heterosexual orientation than women without ASD. Homosexual women with ASD had a higher risk of having negative sexual experiences. Identifying as a transsexual increased the risk of negative sexual experiences only in women with ASD.
Stagg and Vincent (2019)	177 participants (66 M, 111 F)	18	There was a higher proportion of people with ASD or high levels of autistic traits in transgender and non-binary groups, particularly for women with ASD.
Van de Miesen <i>et al.</i> , (2018)	Adolescents 573 ASD group (104 F, 469 M) 1016 Non-ASD group (521 F, 495 M) Adults 807 ASD group (191 F, 616 M) 846 Non-ASD group (465 F, 381 M)	Men 15-34 in both groups	11.4 % of adults with ASD and 6.5 % of adolescents with ASD wished to belong to the opposite gender. Adolescent girls with ASD had stronger desires to belong to the opposite gender than adolescent boys with ASD. Both adolescents and adults with ASD who exhibited a desire to belong to the opposite gender presented internalizing problems.
Walsh <i>et al.</i> , (2018)	297 M cisgender 272 F cisgender 25 M transgender 75 F transgender	40-60	The “trans and non-binary” group had greater sensorial hypersensitivity than the cisgender group. 15 % of the participants identified as non-binary. 21.6 % of the women identified outside the binary category compared to 7.8 % of the men.

Note: F = female, M = male; TD = Typically developing.

while in the cisgender group, only 4 % of the participants had such a diagnosis. The study by Walsh *et al.*, (2018) also found more autistic traits in transgender and non-binary participants than cisgender participants, and the proportion of women who presented a non-binary or transsexual identity was greater (21.6 %) than the proportion of men (7.8 %). Cooper *et al.*, (2018) noted that women with ASD with gender incongruity tended to identify more with a non-binary gender (26.5 %) than men did (7 %). Another piece of evidence supporting the increased probability that women with ASD would have a transgender identity is the study by Pecora *et al.*, (2020), who indicated that they were 1.68 times more likely to present a transgender identity than women without ASD. The studies by Dewinter *et al.*, (2017) and van der Miesen *et al.*, (2018) indicated that women with ASD did not identify with their biological gender, and had a preference for the opposite gender. Over a fifth (22 %) of women with ASD and 8 % of men with ASD had feelings of non-conforming gender, and women with ASD did not identify themselves strictly as women. These women identified more with masculine stereotypes than feminine stereotypes, compared to women without ASD (Cooper *et al.*, 2018). In addition, the studies found differences according the developmental stage between adolescents and adults, with adults expressing greater desire to belong to the opposite gender than adolescents (11.4 % vs. 6.5 %).

Secondly, studies found that gender dysphoria was more prevalent in the ASD population than in the population without ASD ($p < .001$) (George and Stokes, 2018a). In addition, they found higher rates of women who do not conform to their biological sex (Mahfouda *et al.*, 2019). Kallitsounaki and Williams (2020) and Kallitsounaki *et al.*, (2020) reached the same conclusion, the more ASD traits a person presents, the more memories they have of gender incongruity in infancy and the greater the traits of gender dysphoria they exhibit in the present. In fact, they found that the probability of having clinically significant levels of gender dysphoria was 50.17 times higher in participants with ASD than in participants without.

The reviewed literature also included studies focused on analysing the possible relationships between ASD, gender dysphoria and the Theory of Mind (TM) (Kallitsounaki and Williams, 2020; Kallitsounaki *et al.*, 2020). This construct is understood as the capacity to have mental representations, to recognize them and attribute them to others, such that it allows an individual's full social development as it involves the capacity to explain and predict behaviours (Ortiz *et al.*, 2010). They concluded that TM moderated the relationship between ASD traits and gender dysphoria. In people with ASD, exhibiting problems with their capacity for TM, there was increased variability in gender identity, which was seen as early as in infancy (Kallitsounaki *et al.*, 2020; Kallitsounaki and Williams, 2020).

3.2. Factors related to gender non-conformity in people with ASD

Research interest has also been directed towards the factors that might explain the greater prevalence of gender non-conformity in people with ASD than in people without. Studies have looked at two types of factors, biological and psychological.

Some studies have noted that hormonal factors may play an important role in autism, and may be responsible for some of its traits. From that perspective, foetal testosterone has been mooted as a component of ASD's complex neurobiological aetiology, and might be one possible explanation for its high prevalence in men (Auyeung *et al.*, 2009; Xiong *et al.*, 2020). In women, this increased level of testosterone may explain greater gender incongruence, as it is key in shaping both behavioural and physical masculine characteristics, gender identity, and sexual orientation. However, this hypothesis would not help explain gender incongruency in men with ASD (George and Stokes, 2018b; May *et al.*, 2017).

Psychological factors have also been identified, including the cognitive inflexibility exhibited by those with ASD. Van der Miesen *et al.*, (2018) hypothesized that cognitive inflexibility would produce restricted interest about the opposite gender, which might help explain the greater presence of gender dysphoria in people with ASD.

Lastly, four studies addressed the implications of gender dysphoria on this population's quality of life and mental health. George and Stokes (2018a) compared scores in depression, anxiety, and wellbeing in people with and without ASD, considering sexual orientation and the presence or absence of gender dysphoria. Their results showed that feeling non-conformance with assigned gender worsened mental health, such that gender dysphoria was a more severe problem than non-conventional sexual orientation in both groups, and even more so in the group with ASD. Studies by Cooper *et al.*, (2021), Mahfouda *et al.*, (2019), and van der Miesen *et al.*, (2018) came to similar conclusions, reporting that people in the group with ASD, or with more ASD traits, who also presented gender dysphoria had a higher risk of presenting clinical problems related to anxiety and depression. The study by Cooper *et al.*, (2018) found that people with ASD, especially women, tended to present less affiliation with and had more negative feelings about their gender group. They also considered the possibility that, as there was a greater variety of gender identities among women with ASD, they would find it difficult to identify with a group or its members. That could have a negative impact on their quality of life, which, together with the stigmatizing labelling of belonging to a minority gender, would put these people at risk of being victims of bullying and violence (Cooper *et al.*, 2018)

3.3. *Frequency of non-heterosexual orientation in people with ASD*

This section describes the results related to sexual orientation according to the various dimensions that make up this multidimensional construct (sexual identity, behaviour, and attraction). The results are summarized in Table 2.

With regard to sexual identity and sexual attraction, most of the studies concluded that people with ASD tended to identify more with a non-heterosexual orientation compared to their peers. In studies focusing on women, Bush *et al.*, (2019) reported that 92 % of the women with ASD presented a non-heterosexual orientation, compared to 72 % of women without ASD. These high percentages in

both groups may be largely explained by the study being specifically announced as open to people with diverse gender identities. Pecora *et al.*, (2020) found that women with ASD were 2.39 times more likely to present homosexual orientations, and 2.33 times more likely to be bisexual than their non-ASD peers. Similar results were found by May *et al.*, (2017), with the probability of women with ASD being bisexual being almost seven times higher than in women without ASD (27 % vs. 4 %). However, this proportion was somewhat smaller in the study by Bush *et al.*, (2020), in which 15 % of the women with ASD were bisexual.

In a study with a sample of men and women, 69.7 % of people in the ASD group, compared to 30.3 % of people in the non-ASD group, presented a non-heterosexual orientation, and there was a wider range of sexual orientations in the ASD group than the non-ASD group, more so in the women with ASD than the men with ASD ($p < .001$) (George and Stokes, 2018b). Similar results were reported by Dewinter *et al.*, (2017), who found that one in seven women were homosexual compared to one in twenty men. In a large sample, Weir *et al.*, (2021) found a higher proportion of women with autism with non-heterosexual orientation compared to men with autism. However, George and Stokes (2018b) reported a higher percentage of homosexual orientations in men with ASD than women with ASD, and more bisexual orientation in women with ASD than men with ASD.

Unlike the studies above, those by Fernandes *et al.*, (2016) did not produce the same results. In the first of their studies, those authors found that of the participants presenting sexual desire, 60 % ($n = 39$) were heterosexual, whereas 29 % ($n = 19$) were homosexual or had interest in solo sex. In the second study, they found a higher percentage of heterosexual participants (89 %; $n = 49$), and smaller proportions of homosexual (5 %; $n = 3$) and bisexual (5 %; $n = 3$) participants than in the first study. It is worth noting that in their first study, 94.4 % of the participants presented an associated intellectual disability, whereas in the second, there was only one participant with an intellectual disability. The study by Qualls *et al.*, (2018) focused on the broad phenotype of autism, a construct covering a series of similar characteristics to ASD, although manifesting in less severe ways, such as social and communicative difficulties, inflexible behaviours, and problems describing their own feelings, without meeting the criteria for a diagnosis. The results of this study showed that, like in the ASD population, people with higher levels of the broad autism phenotype presented higher rates of homosexual orientation ($\beta = 0.22$, $t = 2.72$, $p = .007$, $\Delta R^2 = .04$, $F = 7.41$, $p = .007$), principally in women ($\beta = 0.18$, $t = 1.07$, $p = .299$, $\Delta R^2 = .02$, $F = 1.15$, $p = .299$).

There have been various notable results in terms of sexual behaviour. More sexual activities (i.e., with other people or solo) were found in women with ASD, particularly solo masturbation or viewing pornography (Bush, 2019; Bush *et al.*, 2020). In addition, evidence was found that women with ASD had more negative sexual experiences than women without ASD (Pecora *et al.*, 2020). Studies have also highlighted inappropriate sexual behaviours, such as public masturbation from people with ASD with intellectual disability, or feeling attracted to minors from people with ASD without intellectual disability (Fernandes *et al.*, 2016).

Women with ASD demonstrate similar levels of sexual satisfaction to women without ASD (Bush, 2019), although women with ASD who presented an asexual orientation reported higher levels of sexual satisfaction than those presenting any other type of orientation (Bush *et al.*, 2020).

Something else to note is that some studies indicate that women with ASD begin to have sexual relations at a younger age than women without ASD. May *et al.*, (2017) found that the mean age that girls with ASD have their first sexual encounter was 12 years old, compared to 14 for girls without ASD. Weir *et al.*, (2021) found similar results.

TABLE 2. Characteristics of articles about sexual orientation in people with ASD

Author (year)	N Participants	Age O	Results
Bush (2019)	ASD group ASD = 248 TD group = 179 all F	18-30	Non-heterosexual orientation, ASD vs TD (92 % vs 72 %). Women with ASD had lower levels of sexual desire and sexual preoccupation.
Bush <i>et al.</i> , (2020)	ASD group = 247 all F	18-30	36 % of the participants were asexual, 15 % bisexual, 14 % pansexual, 10 % queer, 8 % heterosexuals, and 6 % gay or lesbian.
Fernandes <i>et al.</i> , (2016)	Study 1 ASD group = 108 (30 F, 78 M) Study 2 ASD group = 76 all M	15-39	Study 1: 39 participants had a sexual interest in the opposite sex, 19 towards the same sex or themselves. Only 29 % of the participants presented inappropriate sexual behaviour, such as public masturbation (21 %). Study 2: out of 95 % of the participants, 89 % were heterosexual, 5 % homosexual, and 5 % bisexual.
Qualls <i>et al.</i> , (2018)	N = 177, 132 F, 33 M, 12 other gender	18-30	Individuals with higher levels in the BAPQ presented greater sexual attraction towards the same sex. The BAPQ was a significant predictor for women's sexual orientation, but not men's.

TABLE 2. Characteristics of articles about sexual orientation in people with ASD			
Author (year)	N Participants	Age O	Results
George and Stokes (2018b)	ASD group = 310 219 F, 90 M, 1 intersex. DT group = 261 158 F, 103 M	32-33	69.7 % of the participants in the ASD group presented a non-heterosexual orientation compared to 30.3 % of the non-ASD group. Women with ASD were more likely to present a wider range of sexual orientations than men with ASD. Dimensions in ASD: (a) sexual attraction: less likely heterosexual orientation, but more homosexuality and bisexuality; (b) sexual contact: less likely heterosexual, but more asexual; (c) sexual identity: more likely bisexual and asexual identity.
Ronis <i>et al.</i> , (2021)	(126 M, 173 F, 6 queer, 4 trans masc., 4 trans fem., 6 no gender, 9 bigender, 4 other)	21-72	Some participants linked their asexual identity more with a lack of desire or perceived ability in beginning interpersonal relations than with a lack of sexual attraction.
Weir <i>et al.</i> , (2021)	N = 2386 (n = 1183 with ASD) 1571 F, 815 M	16-90	People with ASD expressed a broader range of sexual orientations in different specific patterns of sex than the general population. Women with ASD were more likely to have diverse sexual orientations.

Note: F = female, M = male; TD = Typically developing; BAPQ = Broad Autism Phenotype Questionnaire.

3.4. *Psychosocial factors related to non-heterosexual orientation in people with ASD*

The reviewed literature also mentioned various psychosocial factors that might explain the greater prevalence of non-heterosexual orientation in people with ASD than in the population without ASD. One is that people with ASD have greater difficulty understanding social norms than their peers, meaning that they do not feel judged for having a certain orientation. Another explanation may be their cognitive inflexibility. When establishing relationships with their peers, they tend to seek people of the same sex because they believe that they can manage to understand them better. Also related to this cognitive inflexibility, some studies indicate that the type of orientation that is presented in adolescence stays the same throughout life (Dewinter *et al.*, 2017; George and Stokes, 2018b; May *et al.*, 2017). Similarly, Ronis *et al.*, (2021) indicated that an asexual identity seemed to be more related to a lack of desire or ability to initiate interpersonal relationships than to a lack of sexual attraction.

Finally, three studies addressed the implications of non-heterosexual orientations on the quality of life and mental health of people with ASD. Significantly fewer symptoms of anxiety were found in asexual women with ASD than asexual women in the non-ASD population ($t(245) = -2,14, p = .03$, Cohen's $d = .29$), leading to the conclusion that having a diagnosis of ASD had a protective effect against anxiety where there was an asexual orientation (Bush *et al.*, 2020). The study by Pecora *et al.*, (2020) examined negative sexual experiences in relation to sexual orientation. Women with ASD who had a homosexual orientation were more likely to have had negative sexual experiences—particularly regretting some sexual behaviours—than women with ASD with homosexual orientations. The study by George and Stokes (2018a) looked at depression, anxiety, and personal wellbeing. They found that people with ASD, gender dysphoria, or a non-heterosexual orientation exhibited worse mental health than people with none of these conditions. Moreover, belonging to a minority sexual group did not worsen mental health for people with ASD, but worse mental health was found in people with non-heterosexual orientations.

4. Discussion

The objectives of the current systematic review were to determine whether gender-nonconformity and non-heterosexual orientation were more common in people with ASD and to examine which factors are associated with gender non-conformity and non-heterosexual orientation in this population.

Most of the evidence supports the idea that there is a greater prevalence of transgender identity and non-binary gender identity in the ASD population than in the non-ASD population. This prevalence of non-binary gender identity has been noted in other studies (Bejerot and Erikson, 2014; Hillier *et al.*, 2020; Hurst, 2016), which reported that women with ASD do not feel that they identify with the feminine roles

set by society. In other words, the social norms linked to being a man or woman do not allow women with ASD to feel that they identify with a closed type of gender identity, and so they opt for a gender identity that is less pigeonholed than this binary system. These results may also be related to the weak affiliation to the gender group seen in the women who participated in the study by Cooper *et al.*, (2018).

In line with other studies (Glidden *et al.*, 2016; Hervas and Pont, 2020), there was also higher rates of gender dysphoria in this group than in the neurotypical population. This was more prevalent in women with ASD than in men with ASD or the population without ASD.

Studies about sexual orientation showed greater prevalence of non-heterosexual orientation in the ASD population than in the general population, specifically homosexual and bisexual orientation. The highest rates of non-heterosexual orientation were again found in women with ASD, which coincides with other studies (Bejerot and Erikson, 2014; Hervas and Pont, 2020; Hillier *et al.*, 2020; Hurst, 2016).

In contrast to previous reviews and studies, which demonstrated a scarcity of studies about women with ASD (Glidden *et al.*, 2016), in the present review there were more studies with women. In most of the studies reviewed, both about gender identity and sexual orientation, there were more women than men. Nonetheless, the lack of studies about children and adolescents continues, as most of the studies making up the sample for the present review were with adults.

Some of the literature reviewed exhibited interest in the theories and factors that might explain this higher prevalence in people with ASD. In addition to the factors already noted previously, Bejerot and Erikson (2014) discussed the theory of the Extreme Male Brain (Baron-Cohen, 2009) as a possible explanation for these findings. This theory is based on the existence of gender differences in empathy (related to feelings and emotional reactions in relation to interest in others) and systematization (related to the construction of systems and interest in how objects work). In general, women score higher in tests assessing empathy and men score higher in tasks needing systematization. Both men and women with ASD have been found to have more systematic brains that are more interested in structure than empathetic. This may be related to high levels of testosterone that are found in the ASD population. The theory of elevated Foetal Testosterone has been used to defend the idea that hormonal factors may play an important role in ASD. These factors may, to some extent, explain the greater prevalence of gender dysphoria in women with ASD (although not in men with ASD).

Another explanation raised and discussed in two of the reviewed studies relates to TM (Kallitsounaki and Williams, 2020; Kallitsounaki *et al.*, 2020). Those studies indicated that TM moderated the formation of gender identity in people with ASD, as it made it harder for incongruence with biological sex to be able to cause gender dysphoria in these people. More research is needed about this moderating variable, which only those two studies assessed.

These difficulties in TM are not only able to affect gender identity, they may also cause problems around sexuality. TM is related to sexual awareness, i.e., one's own knowledge, thoughts, and feelings, and those of others in relation to sexu-

ality (Hanna and Stagg, 2016; Hurst, 2016). According to the study by Hanna and Stagg (2016), people with ASD had less awareness of the impression society had about their sexuality and how they demonstrate it. This low awareness is related to self-control, which is why this may be a variable that explains inappropriate sexual behaviours, especially stalking and abuse, along with excessive masturbation, exhibitionism, and inappropriate behaviours in intimate relations (Beddows and Brooks, 2016; Fernandes *et al.*, 2016; Hana and Stagg, 2016).

One problem that arises related to this low sexual awareness and low assertiveness, particularly in women with ASD, is sexual victimization (Hanna and Stagg, 2016; Hurst, 2016). Because of this lower awareness, women with ASD may find it difficult to know whether they want to continue sexual acts with a partner, and they may become victims if they do continue where they actually do not want to participate. This may help explain the negative sexual experiences found in the study by Pecora *et al.*, (2020), who highlighted regret about sexual experiences.

These situations indicate the need for tailored, individualized sex education for people with ASD from young ages so that they are able to understand the changes to their bodies in adolescence and in order to reduce the possible unease that their cognitive inflexibility might cause. The main route for delivering knowledge about sexuality should be from a specialist to prevent them from getting their main information through the internet or through pornography, where the acts they see do not match reality and may lead to inappropriate behaviours.

Parents, carers, and various professionals should be aware that many people with ASD have a sexual interest, and they need to be given the skills they need to form partner relationships, and to know how to approach people properly to avoid possible bullying or abuse. Above all, this social awareness needs to be developed so that it may act as a protective factor, particularly for women with ASD, against sexual victimization, as it did against early sexual activity in the study by May *et al.*, (2017). In addition, in line with the view of Beddows and Brooks (2016), there should be sex education that comes from the family setting and which reinforces the formal sex education that this groups should receive.

An education is needed which teaches social norms and rules, not only in the area of communication and social interaction, but also in the area of sexual behaviour, so that people with ASD can adapt to their circumstances and avoid inappropriate behaviour. One of the studies reviewed (Bush *et al.*, 2020) reported that women with ASD who had an asexual orientation demonstrated higher levels of sexual satisfaction than women with other orientations, perhaps related to problems finding a partner due to difficulties with communication or interaction, problems dealing with sexuality related behaviours with a partner, or because of excessive masturbation, which in many cases can be explained by hypo- or hypersensitivity to touch that people with ASD may have, and which may lead them to self-stimulation.

This education will have a direct impact on the quality of life and the mental health of people with ASD, who, as the systematic review has shown, present high levels of characteristics of anxiety and depression. Presenting a gender identity and a sexual identity that is different to the majority and different from what is socially

accepted causes a stigmatization that affects not only those with ASD, but everyone who does not follow those social patterns. People with ASD have to deal with this stigmatization from society in addition to presenting with ASD, which could affect their understanding of how they feel and who they are.

Future lines of research should focus on the study of gender identity and gender dysphoria in infancy, because gender identity begins to be shaped at a young age. In addition, studies need to continue with women, and with balanced samples of men and women in comparison with the general population. It would also be interesting to have longitudinal studies of sexual orientation from a multidimensional perspective, as it can vary over a person's lifetime.

With the objective of developing protective factors that would reduce the probability of sexual violence, abuse, and inappropriate behaviours, as well as improving the quality of life and the mental health of people with ASD, it is important to provide specific sex education in line with their needs. In addition to developing a clinical guide addressing evaluation and treatment of gender dysphoria (Strang *et al.*, 2018), there also need to be support activities for these people in the educational setting, particularly for women with ASD.

Like all research, this study is not without limitations. One limitation relates to the design and methodology of some of the studies reviewed. Not referring to the presence or absence of intellectual disability in the subjects with ASD may have caused differences to the results, as people with high functioning ASD give more, and more precise, information and better understand the questions about what is being evaluated. That means that it is a very important variable to understand and control for. In other studies, in contrast, there were no comparison groups, or the differences between participants in the control group and the ASD group were conspicuous. In addition, various studies noted participants' difficulties in understanding the questions they were being asked, which may have biased the responses. Finally, it is also possible that this review did not include relevant articles (because the full text could not be found).

In conclusion, the prevalence of gender dysphoria and non-heterosexual orientation in people with ASD is high, particularly in women. This topic needs to be examined in more depth, particularly in infancy and adolescence, in order to implement support and resources to meet these people's needs.

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