

## ORIGINAL RESEARCH—INTERSEX AND GENDER IDENTITY DISORDERS

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### Gender Variance in Childhood and Sexual Orientation in Adulthood: A Prospective Study

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#### ABSTRACT

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**Introduction.** Several retrospective and prospective studies have reported on the association between childhood gender variance and sexual orientation and gender discomfort in adulthood. In most of the retrospective studies, samples were drawn from the general population. The samples in the prospective studies consisted of clinically referred children. In understanding the extent to which the association applies for the general population, prospective studies using random samples are needed.

**Aim.** This prospective study examined the association between childhood gender variance, and sexual orientation and gender discomfort in adulthood in the general population.

**Methods.** In 1983, we measured childhood gender variance, in 406 boys and 473 girls. In 2007, sexual orientation and gender discomfort were assessed.

**Main Outcome Measures.** Childhood gender variance was measured with two items from the Child Behavior Checklist/4–18. Sexual orientation was measured for four parameters of sexual orientation (attraction, fantasy, behavior, and identity). Gender discomfort was assessed by four questions (unhappiness and/or uncertainty about one's gender, wish or desire to be of the other gender, and consideration of living in the role of the other gender).

**Results.** For both men and women, the presence of childhood gender variance was associated with homosexuality for all four parameters of sexual orientation, but not with bisexuality. The report of adulthood homosexuality was 8 to 15 times higher for participants with a history of gender variance (10.2% to 12.2%), compared to participants without a history of gender variance (1.2% to 1.7%). The presence of childhood gender variance was not significantly associated with gender discomfort in adulthood.

**Conclusions.** This study clearly showed a significant association between childhood gender variance and a homosexual sexual orientation in adulthood in the general population. In contrast to the findings in clinically referred gender-variant children, the presence of a homosexual sexual orientation in adulthood was substantially lower. **Steensma TD, van der Ende J, Verhulst FC, and Cohen-Kettenis PT. Gender variance in childhood and sexual orientation in adulthood: A prospective study. J Sex Med 2013;10:2723–2733.**

**Key Words.** Gender Variance; Childhood; Sexual Orientation; Gender Discomfort; Homosexuality

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#### Introduction

Over the years, several studies reported on the association between gender variance or

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cross-gender behavior in childhood and sexual orientation and gender discomfort in adulthood. Thus far, the extent to which this association applies for the general population is unclear. In order to get more insight in the relationship between childhood gender variance and adulthood sexual orientation and gender discomfort in the

general population, prospective studies using standardized measures in random samples are needed.

Irrespective of the measures used to determine gender variance in childhood (e.g., cross-gender play behavior, activities, peer preference and role models, cross-dressing, or identification with same or other gender), the conclusions drawn from various retrospective and prospective studies are rather similar. Retrospectively, homosexual individuals recalled more gender-variant behavior in childhood, as compared to their heterosexual counterparts (see for an overview references [1,2]). Likewise, studies in clinically referred gender-variant adolescents and/or adults showed the presence of gender variance in childhood (i.e., [2–6]). Prospectively, the presence of childhood gender variance was associated with a homosexual or bisexual sexual orientation in adulthood (e.g., [7,8], see for an overview reference [9]). Furthermore, most of the same studies also indicated an association between childhood gender variance and gender variance in adolescence, in clinically referred boys and girls ([7,8], see for an overview reference [9]).

However, it is currently not clear why childhood gender variance and sexual orientation and childhood gender variance and gender discomfort in adulthood are associated. One explanation is that the phenomena have common biological roots. There is evidence that gender-related behavior is influenced by prenatal brain exposure to sex hormones (see for a review reference [10]) and that this behavior is heritable [11–13]. With regard to adulthood sexual orientation and gender discomfort, differences have been found in certain brain structures between homosexual-oriented individuals and heterosexual-oriented individuals (e.g., [14,15]) and in certain neuroanatomic structures in male-to-female and female-to-male transsexuals [16–18]. Possibly related to this, although the validity of this measure for indirectly measuring the exposure of prenatal hormones is questionable, differences have been found in 2nd–4th finger length (2D:4D) ratios for individuals with a homosexual sexual orientation (see for an overview reference [19]) and for transsexuals [20–22]. However, there is currently no direct biological evidence of a relation between childhood gender-related behavior and sexual orientation or gender discomfort in adulthood.

With regard to the methodology of the studies that link childhood gender variance to adult homosexuality or adult gender discomfort, the retrospective studies can be criticized because of biased recall. Information on what has occurred

in the past may be inaccurately recalled or distorted as a result of internalized societal or cultural stereotypes [23,24], such as a person's beliefs about the association between childhood gender variance and sexual orientation. However, the reports on the association of childhood gender variance and a homosexual sexual orientation in adulthood do not only come from studies performed in Western cultures [25,26], but also from non-Western cultures (e.g., [27–30]). Furthermore, the number of prospective studies examining the association between childhood gender variance and sexual orientation or gender discomfort in adulthood appears to be limited. Only one study prospectively examined factors in childhood that may have influenced gender discomfort in adolescence and young adulthood [8]. They showed that the more intense the report of gender variance in childhood, the higher the likelihood of persisting gender variance and gender discomfort in adolescence. As for sexual orientation, the literature before the 1970s primarily consists of case reports [31]. Other studies, conducted with larger samples (e.g., [7,8] see for an overview reference [9]), showed that childhood gender variance was associated with a report of a bi- or homosexual sexual orientation in adolescence or young adulthood. Nevertheless, these prospective findings probably cannot be generalized to all adults with a homosexual sexual orientation. The samples under study in nearly all prospective studies were clinically referred children who showed extreme forms of childhood gender variance (i.e., extreme cross-gender behaviors). A considerable number of these children even explicitly expressed feelings of gender dysphoria and/or fulfilled all criteria for gender identity disorder from the Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revision (DSM-IV-TR) [32]. Retrospective findings have shown that such extreme childhood gender variance is not universal for homosexual sexual-oriented individuals [9].

To get a greater understanding of the association between childhood gender variance and sexual orientation, and childhood gender variance and gender discomfort in adulthood, prospective studies among children who are representative for the general population are needed. In the current prospective study, we examine the association between childhood gender variance and adulthood sexual orientation and gender discomfort in a sample of 879 boys and girls from the general population.

## Methods

### Participants and Procedure

Since 1983, a longitudinal population-based study on emotional and behavior problems in children has been enrolled at the Department of Child and Adolescent Psychiatry at the Erasmus MC-Sophia Children's Hospital in Rotterdam, The Netherlands. Using municipal registers, a representative sample of the Dutch population was drawn from the Dutch province of Zuid-Holland. The initial sample consisted of 2,600 children in 13 birth cohorts aged 4 to 16 years. Of the 2,447 eligible parents, 2,076 (84.8%) participated in the study (for details of the initial data collection, see reference [33]). Subsequent to the first assessment in 1983, the parents and children were approached again and assessed repeatedly at a 2-year interval in 1985, 1987, 1989, 1991 (for details of the first five assessment waves, see reference [34]), and thereafter in 1997 [35] and 2007 [36].

In the current study, the sample of 2,076 participants was limited to those who were younger than 12 years of age in 1983 (T1,  $N = 1,297$ ). Of these 1,297 children, 879 individuals (67.8%) also participated in adulthood, 24 years after initial data collection, in 2007 (T2). The mean age of the participants at T1 was 7.5 years (age range 4–11) and 30.9 years (age range 27–36) at T2. At the first assessment wave, information with regard to the presence and intensity of childhood gender variance was determined through parental/primary caregiver report. In adulthood, sexual orientation and information regarding gender discomfort was determined through self-report.

With regard to the sample under study (see Table 1), a significant difference in the distribution of boys and girls was observed between the chil-

dren who remained ( $N = 879$ ) and the children who dropped out of the study ( $N = 418$ ). More boys dropped out of the study, compared to girls. For age, the presence, and the intensity of gender variance in childhood, no significant differences were observed between the children who remained and the children who dropped out of the study.

### Measurements

#### Childhood Gender Variance (T1)

The presence and intensity of gender variance in childhood (T1) was determined through parental report with the use of the Dutch version of the Child Behavior Checklist/4–18 (CBCL; [37,38]). The CBCL was filled out by either the mother ( $N = 813$ , 92.5%), the father ( $N = 58$ , 6.6%), or other primary caregivers ( $N = 8$ , 0.9%). Two specific items of the CBCL/4–18 are characteristic for gender variance: “Behaves like opposite sex” (Item 5) and “Wishes to be of opposite sex” (Item 110). Parents rate both items for the occurrence of the specific behavior for the past 6 months, using the following scale: 0 = not true, 1 = somewhat or sometimes true, and 2 = very true or often true. Following the method of Cohen-Kettenis et al. [39], both items were combined to one scale for gender variance, ranging from 0 to 4, representing the intensity in gender variance (Cronbach's alpha 0.41). The presence of gender variance was operationalized as the presence or absence of gender variance in childhood, regardless of the intensity in gender variance (a score of 1 or higher on the gender variance scale). No significant differences were observed between the reports of fathers, mothers, or primary caregivers for the presence or intensity of gender variance in childhood.

**Table 1** Distribution for gender, mean age, intensity, and the presence of gender variance for the total group, the participants, and the dropouts

	Total group ( $N = 1,297$ )	Participants ( $N = 879$ )	Dropouts ( $N = 418$ )	$t$ or $\chi^2$	df	$P$
Gender						
% Boys (N)	48.8 (663)	46.2 (406)	54.3 (227)	7.47	1	0.006*
% Girls (N)	51.2 (664)	53.8 (473)	45.7 (191)			
Age						
M	7.48	7.47	7.51	-0.283	1,295	0.777
SD	2.29	2.31	2.27			
Intensity GV						
M	0.08	0.09	0.08	0.334	1,295	0.739
SD	0.379	0.387	0.361			
Presence GV						
% GV present (N)	5.7 (74)	5.8 (51)	5.5 (23)	0.05	1	0.828
% GV absent (N)	94.3 (1,223)	94.2 (828)	94.5 (395)			

\*Significant difference,  $P < 0.05$

### Sexual Orientation in Adulthood (T2)

Psychosexual outcome in adulthood was determined by four questions addressing four parameters of sexual orientation: “To whom do you feel attracted?” (sexual attraction), “About whom do you fantasize sexually?” (sexual fantasy), “With whom do you have sexual contact?” (sexual behavior), and “How do you identify yourself?” (sexual identity) [8]. The questions regarding sexual attraction, sexual fantasy, and sexual identity were rated on a seven-point Kinsey Scale ranging from exclusively heterosexual (0) to exclusively homosexual (6) [40]. Subsequently, according to their scores, participants were classified in three sexual orientation categories: (I) heterosexual (Kinsey rating 0–1), (II) bisexual (Kinsey rating 2–4), and (III) homosexual or lesbian (Kinsey rating 5–6). With regard to sexual behavior, the question was rated on a two-point scale: (I) a sexual partner of the same gender or sexual partners of both genders (homosexual, lesbian, or bisexual) or (II) a sexual partner of the other gender (heterosexual). The reliability of the sexual orientation parameters was high (Cronbach’s alpha 0.91), for both males (Cronbach’s alpha 0.97) and females (Cronbach’s alpha 0.82).

### Gender Discomfort in Adulthood (T2)

Information with regard to the presence of gender discomfort in adulthood was assessed by four questions rated on a five-point scale (1 = never to 5 = always). The first two questions were based on the A and B criteria of the DSM-IV-TR for gender identity disorder [32]: (I) “In the past 12 months, did you have the wish or desire to be a man or a woman?” (The wish or desire to be of the other gender), and (II) “In the past 12 months, did you feel unhappy with the fact of being a man or a woman?” (Unhappiness with being a man or a woman). Two other questions were asked: (III) “In the past 12 months, did you experience feelings of doubt or uncertainty about your gender?” (Feelings of doubt and uncertainty about one’s gender), and (IV) “In the past 12 months, did you consider living in the role of the other gender?” (Consideration of living in the role of the other gender). Given the low reliability when the four items were combined into a single scale (Cronbach’s alpha 0.45), and the frequency distribution in responses, the four questions were analyzed separately and the answer categories were dichotomized (0 = never and rarely, 1 = sometimes, often, and always).

### Statistical Analyses

The statistical analyses were performed in SPSS (SPSS, Inc., Chicago, IL, USA). Linear regressions, with age and gender entered as predictor variables, were performed to analyze gender and age differences for the intensity of gender variance in childhood. The presence of childhood gender variance was analyzed with logistic regressions, with age and gender entered as predictor variables.

To examine the association between the presence and intensity of childhood gender variance and the presence of a bi- or homosexual sexual orientation in adulthood for the parameters sexual attraction, sexual fantasy, and sexual identity in adulthood, logistic regression analyses were performed with gender and the presence and intensity of childhood gender variance entered as predictor variables. Because of the dichotomous response category for the parameter sexual behavior, the association between the presence and intensity of childhood gender variance and sexual orientation was only examined with regard to the participants who reported a homosexual sexual orientation in adulthood. Within the analyses, the participants who reported a heterosexual sexual orientation were treated as the reference group.

Likewise, logistic regression analyses were performed to examine the relation between the presence and intensity of childhood gender variance and gender discomfort in adulthood. Gender and the presence and intensity of childhood gender variance were entered as predictor variables for gender discomfort in adulthood. The participants who did not report any gender discomfort in adulthood were treated as the reference group.

## Results

### Childhood Gender Variance

Table 2 shows the presence and intensity of reported childhood gender variance. Childhood gender variance was reported for 5.8% (N = 51) of the 879 children. With regard to the score distribution within the gender variance scale, for the 51 children for whom childhood gender variance was reported, 62.7% (N = 32) had a score of 1, 25.5% (N = 13) had a score of 2, and 11.8% (N = 6) had a score of 3. The two CBCL items were distributed within the gender variance scale in the following way: Item 5: “Behaves like opposite sex” was endorsed for 41 children, Item 110: “Wishes to be of opposite sex” was endorsed for 19 children. For 17.6% (N = 9) of the 51 children for whom

**Table 2** Presence and intensity of childhood gender variance for the total group, boys and girls

	Childhood gender variance					Item 5: "Behaves like opposite sex"					Item 110: "Wishes to be of opposite sex"				
	Intensity			Presence		Intensity			Presence		Intensity			Presence	
	M	SD	Range	%	N	M	SD	Range	%	N	M	SD	Range	N	
Total group (N = 879)	0.09	0.39	0–3	5.8	51	0.06	0.28	0–2	4.7	41	0.03	0.20	0–2	2.2	19
Boys (N = 406)	0.03	0.21	0–2	2.5	10	0.03	0.22	0–2	2.4	10	—	—	—	—	—
Girls (N = 473)	0.13	0.48	0–3	8.7	41	0.08	0.32	0–2	6.6	31	0.05	0.28	0–2	4.0	19

childhood gender variance was reported, both item 5 and item 110 were endorsed.

With regard to the intensity of gender variance in childhood, only gender appeared to be a significant predictor ( $\beta = 0.13$ ,  $t = 3.91$ ,  $P < 0.001$ ). A higher intensity score was reported for girls ( $M = 0.13$ ,  $SD = 0.48$ ) than for boys ( $M = 0.03$ ,  $SD = 0.21$ ).

As for the presence of childhood gender variance, both age and gender turned out to be significant predictors. Gender variance was reported to be more present in younger children than in older children (odds ratio [OR] = 0.9, 95% confidence interval [CI] = 0.8–1.0). Gender variance was also more present in girls (8.7%,  $N = 41$ ) than in boys (2.5%,  $N = 10$ ) (OR = 3.8, 95% CI = 1.9–7.7).

For both the intensity of gender variance in childhood and the presence of childhood gender variance, interactions between gender and age were not significant.

### Sexual Orientation in Adulthood

As can be seen in Table 3, the sexual orientation for 0.1–2.3% of the participants was unknown for the parameters sexual attraction, sexual behavior, and sexual identity. A bisexual or homosexual sexual orientation was reported by 1.7–4.2% of the participants for one or more of the parameters. Gender did not predict bisexuality in sexual attraction and identity, but did so with respect to fantasy. The reported percentage for bisexual fantasies was 7.8 (95% CI = 1.8–33.8) times higher for women than for men. As for the report of a homosexual sexual orientation in adulthood, we found gender differences for the domain behavior only. Men reported more often to have same-gender partners than women (OR = 0.3, 95% CI = 0.08–0.85).

### Gender Variance in Childhood and Sexual Orientation in Adulthood

When we looked at the gender-variant and non-gender-variant subgroups separately (Table 3),

nonresponders did not significantly differ in the report of childhood gender variance nor the intensity of childhood gender variance. The presence or absence of childhood gender variance was not significantly associated with the report of a bisexual sexual orientation for any of the sexual orientation parameters. With regard to the report of a homosexual sexual orientation, we found much higher percentages reported in the childhood gender-variant subgroup (10.2% to 12.2%) than in the childhood non-gender-variant subgroup (1.2% to 1.7%).

The presence of childhood gender variance appeared to be significantly associated with the report of a homosexual sexual orientation in adulthood for both men and women (see Table 4 for odds ratios and CI per parameter of sexual orientation). The percentages for reported homosexuality in adulthood were, depending on the sexual orientation parameter, 8.4 to 15.8 times higher in the childhood gender-variant subgroup, as compared to the childhood non-gender-variant subgroup. Interactions between gender and the presence of childhood gender variance were not significantly associated with the report of homosexuality for any of the sexual orientation parameters.

With regard to the association between the intensity of childhood gender variance and a bi- or homosexual sexual orientation in adulthood, no significant association was observed.

### Gender Variance in Childhood and Gender Discomfort in Adulthood

Of the 879 participants, all information regarding the four questions assessing gender discomfort in adulthood was available. Thirty-two participants (3.6%), 18 males and 14 females, reported to experience, to some extent, unhappiness or uncertainty about their own gender, or considered to live or wished to be of the other gender, in the past 12 months (Table 5). Differences between men and women in reported gender discomfort were not significant.

**Table 3** Number (within brackets) and percentage of reported sexual orientation in attraction, fantasy, behavior, and sexual identity for the total group, non-gender-variant group, and gender-variant group

	Attraction			Fantasy			Behavior*			Sexual identity		
	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls
<b>Total group</b> (N = 879, ♂ = 406, ♀ = 473)	HT 0.6 (5)	97.5 (384)	97.6 (457)	95.8 (842)	97.3 (395)	94.5 (447)	98.3 (844)	97.5 (387)	98.9 (457)	96.2 (845)	96.5 (391)	96.0 (454)
BS	1.9 (16)	0.3 (1)	0.9 (4)	2.3 (20)	0.5 (2)	3.8 (18)	1.7 (15)	2.5 (10)	1.1 (5)	1.5 (13)	1.2 (5)	1.7 (8)
HS	1.9 (17)	2.3 (9)	1.5 (7)	1.9 (17)	2.2 (9)	1.7 (8)	2.3 (20)	2.2 (9)	1.1 (5)	2.3 (20)	2.2 (9)	2.3 (11)
UK	1.9 (17)	3.0 (12)	1.1 (5)	—	—	—	2.3 (20)	2.2 (9)	1.1 (5)	0.1 (1)	0.2 (1)	—
<b>Non-gender-variant group</b> (N = 828, ♂ = 396, ♀ = 432)	HT 0.5 (4)	97.9 (377)	98.6 (422)	96.5 (799)	97.7 (387)	95.4 (412)	98.8 (800)	97.9 (379)	99.5 (421)	96.9 (801)	97.0 (383)	96.8 (418)
BS	1.2 (10)	0.3 (1)	0.7 (3)	2.2 (18)	0.5 (2)	3.7 (16)	1.2 (10)	2.1 (8)	0.5 (2)	1.5 (12)	1.3 (5)	1.6 (7)
HS	1.8 (15)	1.8 (7)	0.7 (3)	1.3 (11)	1.8 (7)	0.9 (4)	2.2 (18)	2.3 (9)	2.1 (9)	1.7 (14)	1.8 (7)	1.6 (7)
UK	1.8 (15)	2.8 (11)	0.9 (4)	—	—	—	2.2 (18)	2.3 (9)	2.1 (9)	0.1 (1)	0.3 (1)	—
<b>Gender-variant group</b> (N = 51, ♂ = 10, ♀ = 41)	HT 2.0 (1)	77.8 (7)	87.5 (35)	84.3 (43)	80.0 (8)	85.4 (35)	89.8 (44)	80.0 (8)	92.3 (36)	86.3 (44)	80.0 (8)	87.8 (36)
BS	12.2 (6)	0.0 (0)	2.5 (1)	3.9 (2)	0.0 (0)	4.9 (2)	10.2 (5)	20.0 (2)	7.7 (3)	2.0 (1)	—	2.4 (1)
HS	3.9 (2)	22.2 (2)	10.0 (4)	11.8 (6)	20.0 (2)	9.8 (4)	3.9 (2)	—	4.9 (2)	11.8 (6)	20.0 (2)	9.8 (4)
UK	3.9 (2)	10.0 (1)	2.4 (1)	—	—	—	—	—	—	—	—	—

\*The percentages for the parameter "behavior" includes all same-sex partners, homosexuals, lesbians, and bisexuals  
Note: BS = bisexual; HS = homosexual; HT = heterosexual; UK = information on sexual attraction, behavior, and identity was unknown for these participants

**Table 4** Odds ratios for reported homosexuality in adulthood by reported gender variance in childhood

	Attraction			Fantasy			Behavior**			Sexual identity		
	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls
<b>Odds ratio*</b>	15.8	15.4	16.1	12.6	13.8	11.8	14.2	11.8	17.5	8.4	13.7	6.6
<b>95% Confidence interval</b>	5.0–49.7	2.7–87.7	3.5–74.7	4.2–38.0	2.5–77.2	2.8–49.1	4.2–47.8	2.2–64.9	2.8–108.4	2.9–23.9	2.5–76.4	1.9–23.7

\*All reported odds ratios are significant,  $P < 0.05$

\*\*The percentages for the parameter "behavior" includes all same-sex partners, homosexuals, lesbians and bisexuals

**Table 5** Number (within brackets) and percentages of reported gender discomfort in adulthood for the total group, non-gender-variant group, and gender-variant group

	Total group (N = 879)		
	Never/rarely	Sometimes	Often/always
Unhappiness being a man or a woman	97.7 (859)	1.6 (14)	0.7 (6)
Non-gender-variant group	97.7 (809)	1.6 (13)	0.7 (6)
Gender-variant group	98.0 (50)	2.0 (1)	0.0 (0)
Wish or desire to be of the other gender	98.7 (868)	1.1 (10)	0.1 (1)
Non-gender-variant group	98.8 (818)	1.1 (9)	0.1 (1)
Gender-variant group	98.0 (50)	2.0 (1)	0.0 (0)
Uncertainty about one's gender	99.4 (874)	0.5 (4)	0.1 (1)
Non-gender-variant group	99.5 (824)	0.5 (4)	0.0 (0)
Gender-variant group	98.0 (50)	0.0 (0)	2.0 (1)
Consideration of living in the role of the other gender	99.7 (876)	0.2 (2)	0.1 (1)
Non-gender-variant group	99.6 (825)	0.2 (2)	0.1 (1)
Gender-variant group	100 (51)	0.0 (0)	0.0 (0)

For all measured parameters of gender discomfort, neither the presence of childhood gender variance nor the intensity of childhood gender variance, nor gender was associated with gender discomfort in adulthood. Only one female participant, a self-identified lesbian, who reported to experience gender discomfort in adulthood had a report of gender variance in childhood. With regard to the other 31 participants who reported gender discomfort in adulthood, childhood gender variance was absent. Interactions between the presence or intensity of childhood gender variance and gender for gender discomfort in adulthood were not significant.

At the last assessment in 2007, one 29-year-old participant of the 879 subjects reported to have had male-to-female gender reassignment (hormone treatment and surgery) between 22 and 27 years. Interestingly, examination of the childhood data revealed that her parents had not reported childhood gender variance at the time the participant was 6 years of age. At the last assessment, this participant filled out the questionnaires according to her current gender role. She reported being sexually attracted to women. As for the analyses, her scores were recoded, but inclusion or exclusion of the participant did not influence any of the results.

## Discussion

This prospective study was the first to examine whether childhood gender variance in a large non-referred sample was associated with the report of a bi- or homosexual sexual orientation in adulthood, as previous studies in clinically referred children suggest. We found that childhood gender variance was related to gender and age and that it was asso-

ciated with the presence of a homosexual sexual orientation in adulthood, but not with bisexuality, for all measured parameters of sexual orientation. The percentages for a homosexual sexual orientation in sexual attraction, sexual fantasy, sexual behavior, and sexual identity were 8 to 15 times higher for both male and female participants with a parent-reported history of gender variance.

Our findings on higher percentages of reported homosexuality in the gender-variant group are in concordance with the results of previous studies among clinically referred children. However, the observed rates in our study diverged largely from these studies and we did not observe an association between childhood gender variance and adult bisexuality. The percentages reported by the four largest prospective studies on clinically referred gender-variant children indicated that a large proportion of the children reported a bi- or homosexual sexual orientation in adolescence and young adulthood [7–9,41]. Green [41] reported that 41% of the feminine boys, who were followed up, reported a homosexual sexual orientation in fantasy and 44% in behavior. In his sample, 34% reported bisexual fantasies and 37% reported bisexual behavior. Zucker and Bradley [9], with an initial sample of 45 clinically referred children (40 boys and 5 girls), found lower percentages, 20% of the participants reported a homosexual sexual orientation in fantasy and 16% of the participants reported a homosexual sexual orientation in behavior at follow-up, whereas 11% reported bisexual fantasies and 2% reported bisexual behavior. Drummond et al. [7] found a homosexual sexual orientation in fantasy and behavior in 24% of 25 girls; 8% of the girls reported a bisexual attraction in fantasy and none of them reported bisexual behaviors. Wallien and Cohen-Kettenis

[8], following 44 clinically referred gender-variant children in adolescence and young adulthood (31 boys, 13 girls), found percentages for homosexuality in attraction, fantasy, sexual identity, and behavior for 62–68% of the boys and 60–73% of the girls; bisexuality for these parameters was reported for 0–19% of the boys and 0–9% of the girls. By contrast, our findings showed that approximately 85% of the nonreferred participants, despite a history of gender variance in childhood, still turned out to be heterosexual for all four parameters of sexual orientation.

With regard to the weaker association observed in our study between the presence of childhood gender variance and adult homosexuality, as compared to the clinical studies, and the absence of the association for bisexuality, it seems unlikely that it was caused through our measure of sexual orientation in adulthood. The report of a bisexual or homosexual sexual orientation in adulthood by 1.7% to 4.2% of the participants in our study corresponded with prevalence rates reported by prevalence studies performed for the Dutch population [42–44]. Likewise, our findings on childhood gender variance, reported in 5.8% of our children, and more in girls than in boys, and the decline in childhood gender variance over time were in correspondence with findings in normative samples of Achenbach and Edelbrock [37], and also in the studies by Bradley and Zucker [45], and van Beijsterveldt et al. [13]. Nevertheless, a limitation of our measure of gender variance is that it was a small scale, restricted to measuring two broad components (i.e., behavior like the opposite sex and the wish to be of the opposite sex) of the concept “gender variance.” As a result, we may have correctly identified children with gender variance but might have missed more subtle gender-variant behaviors and preferences through which we could have classified our participants more accurately regarding the intensity of their childhood gender variance. It therefore seems likely that our study correctly reflects the association between the presence of childhood gender variance and sexual orientation for the general population, but that we, as a consequence of our measure, did not observe the association between the intensity of childhood gender variance and adult sexual orientation. Measures to assess the intensity of gender variance are currently available for children, e.g., The Gender Identity Questionnaire for Children [46], Gender Identity Interview for Children [47,48]. Future research should take

these more extensive measures of gender variance into account.

Despite the fact that we did not observe an association between the intensity of childhood gender variance and the report of a homosexual sexual orientation, but did find lower reports of homosexuality in this nonreferred gender-variant group than in the clinical groups, this may still suggest some kind of “dose–response relationship”: the more gender variance in childhood, the stronger the association with a homosexual sexual orientation in adulthood. Interestingly, the only prospective study on predictors of more intense forms of postadolescent gender variance, gender dysphoria, in a clinical sample suggests a similar association: the more gender dysphoria in childhood, the higher the likelihood of persisting gender dysphoria [8]. However, what the “dose” would consist of is unclear. Further studies on psychosocial, genetic, and/or hormonal factors are needed to shed more light on this association. As for the absence of an association between the presence of childhood gender variance and adult bisexuality in our study, this is likely to be caused by the fact that the sample size for the bisexual group was smaller, as compared to the homosexual group of participants. The association between the presence of childhood gender variance and adult bisexuality was probably too small to observe.

With regard to gender discomfort in adulthood, we expected that it would be very rare (perhaps nonexistent) in our group, but that the chances of adult gender discomfort would still be higher in the childhood variant than in the non-gender-variant group. However, childhood gender variance did not predict any of the measured gender discomfort parameters. This was also illustrated by the finding that one participant, for whom no childhood gender variance was reported, underwent male-to-female gender reassignment surgery. This absence of a relationship between childhood gender variance and adult gender discomfort may be due to two factors. First, we have tried to capture aspects of adult gender discomfort that are clinically relevant. We therefore based two of our items on the A and B criteria of the DSM-IV-TR for gender identity disorder [32]. As the reported gender discomfort by 1.5% to 2% of our adult participants was much higher than one would expect on the base of gender identity disorder prevalence rates (approximately 1:11.900 for men and 1:30.400 for women; [49]), the participants may have

interpreted the questions on gender discomfort differently than we intended. Other aspects of gender incongruence than gender dysphoria, such as perhaps dissatisfaction about one's gender role or a self-identification with another gender than one's assigned gender without dysphoria, may have played a role in their answers. Second, only more intense gender variance seems to be related to later gender dysphoria [8]. Therefore, the lack of a relationship between childhood gender variance and adult gender discomfort in our sample may have been caused by the fact that in the general population, even in a subgroup with gender-variant behaviors and interests, *clinically relevant* childhood gender variance is very rare. This is in line with current criticism of the DSM-IV-TR criteria of gender identity disorder in children, that gender-variant behavior and interests do not necessarily indicate gender identity disorder, can be seen as ordinary human diversity [50], and do not need clinical attention (e.g., [51–53]).

In conclusion, it appears that childhood gender variance and a homosexual sexual orientation in adulthood are associated in the general population, but this association is much weaker than in clinically referred groups. Importantly, this association is not applicable for the vast majority of gender-variant children and individuals with a homosexual sexual orientation and it does not imply a causal relation between these two phenomena. Having this information about the association between childhood gender variance and psychosexual outcome in the general population is clinically useful for those who work with parents of young gender-variant children. Clinicians could inform parents and caregivers that their child's psychosexual outcome (in terms of sexual orientation or gender dysphoria) cannot be predicted. Instead of suppressing the child's gender variance or promoting a complete social transition that is difficult to reverse (including a name change, using pronouns of the other gender), parents could be advised to adopt a more balanced, neutral approach. They could, for instance, allow a son to dress as a girl in a safe environment, but not in public, until it is clear that the cross-gender desires will persist. Having information about psychosexual development in general and some guidance in how to handle the child's gender variance may make it easier for some parents to lessen the pressure on their child to behave more gender conforming and to be more accepting of their child's gender-variant behavior [54].

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