Childhood Gender-Typed Behavior and Adolescent Sexual Orientation: A Longitudinal Population-Based Study

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Abstract

Lesbian and gay individuals have been reported to show more interest in other-sex, and/or less interest in same-sex, toys, playmates, and activities in childhood than heterosexual counterparts. Yet, most of the relevant evidence comes from retrospective studies or from prospective studies of clinically-referred, extremely gender nonconforming children. In addition, findings are mixed regarding the relationship between childhood gender-typed behavior and the later sexual orientation spectrum from exclusively heterosexual to exclusively lesbian/gay. The current study drew a sample (2,428 girls and 2,169 boys) from a population-based longitudinal study, and found that the levels of gender-typed behavior at ages 3.50 and 4.75 years, although less so at age 2.50 years, significantly and consistently predicted adolescents' sexual orientation at age 15 years, both when sexual orientation was conceptualized as two groups or as a spectrum. In addition, within-individual change in gender-typed behavior during the preschool years significantly related to adolescent sexual orientation, especially in boys. These results suggest that the factors contributing to the link between childhood gender-typed behavior and sexual orientation emerge during early development. Some of those factors are likely to be nonsocial, because nonheterosexual individuals appear to diverge from gender norms regardless of social encouragement to conform to gender roles.

Keywords: gender nonconformity, sexual orientation, gender-typed behavior, LGB, ALSPAC

Childhood Gender-Typed Behavior and Adolescent Sexual Orientation: A Longitudinal Population-Based Study

Childhood gender-typed behavior is perhaps the most extensively studied early behavioral predictor of sexual orientation. Gender-typed behavior, or gender role behavior, refers to behaviors, attitudes, and personality traits that differ on average for females and males (Hines, 2004). Among children, gender-typed behavior can be observed in preferences for male-typical or female-typical toys (e.g., toy trucks versus dolls), playmates (e.g., boys versus girls), and play activities (e.g., rough-and-tumble play versus playing house) (Golomok & Rust, 1993a, 1993b; Maccoby & Jacklin, 1974; Martin, Eisenbud, & Rose, 1995). Childhood gender-typed behavior shows a large sex difference and has been considered as an important component of human gender development (Hines, 2010, 2015).

Another domain of gender development that differs substantially between males and females is sexual orientation (Hines, 2010, 2011). Sexual orientation directs a person's sexuality to men, to women, to both, or to neither; it can be measured using multiple indicators such as romantic and sexual attraction, sexual behavior, sexual identity, and physiological sexual arousal (Bailey et al., 2016; Savin-Williams, 2006). Sexual orientation is manifested in adolescence by ages 12–17 years (Calzo, Masyn, Austin, Jun, & Corliss, 2016; Russell & Fish, 2016), and may be seen in children as young as 10 years of age (McClintock & Herdt, 1996). During adolescence, the most observable indicators of sexual orientation are sexual attraction and perhaps some sexual activities such as kissing on the mouth (Calzo, Antonucci, Mays, & Cochran, 2011; D'Augelli, Grossman, Starks, & Sinclair, 2010; Li & Hines, 2016; McClintock & Herdt, 1996; Rosario et al., 1996; Savin-Williams & Diamond, 2000). Theoretical perspectives and empirical research suggest that individuals with different sexual orientations may show different childhood gender-typed behaviors.

Theoretical Perspectives

Both genetic and hormonal theories suggest a link between childhood gender-typed behavior and sexual orientation. Genes are suggested to influence childhood gender-typed behavior (e.g., Iervolino, Hines, Golombok, Rust, & Plomin, 2005; Knafo, Iervolino, & Plomin, 2005) and (male) sexual orientation (e.g., Sanders et al., 2015; see also Bailey et al., 2016, for a review), and it is possible that some common genes contribute to both of these domains. Twin studies suggest that additive genetic factors account for a modest to substantial amount of the covariance between recalled childhood gender-typed behavior and sexual orientation in women (Alanko et al., 2010; Bailey, Dunne, & Martin, 2000; Burri, Cherkas, Spector, & Rahman, 2011) and in men (Alanko et al., 2010; Bailey et al., 2000).

Early androgen exposure may also contribute to the development of both childhood gender-typed behavior and sexual orientation (Hines, 2011). Substantial evidence suggests that androgen exposure during prenatal and neonatal periods contributes to enduring sex differences in the mammalian brain and behavior (Arnold, 2009; Hines et al., 2016; McCarthy & Arnold, 2011; Morris, Jordan, & Breedlove, 2004). In nonhuman animals, numerous experiments have demonstrated that administration of androgens during early development masculinizes and/or defeminizes later sexual behaviors, as well as other behaviors that differ on average for males and females (Arnold, 2009; Hines, 2004, 2011). In humans, the strongest empirical support for influences of early androgens on gender development comes from research involving females with congenital adrenal hyperplasia (CAH), a recessive autosomal condition that results in increased exposure to testosterone and other androgens, beginning before birth (New, 1998). A number of studies have reported that, compared to unaffected relatives and to matched controls, females with CAH show increased male-typical behavior in childhood, as well as increased nonheterosexual fantasy and behavior in adulthood (Hines, 2011). There is also some evidence that normal variability in androgen exposure relates to childhood gender-typed behavior in typically-developing

children (Hines et al., 2002; Lamminmäki et al., 2012; Pasterski et al., 2015). However, little is known about the influences of early androgen exposure on sexual orientation in typically-developing individuals, perhaps due to the difficulty in measuring early androgen concentrations reliably and accurately in a sufficiently large sample, and following the sample into adolescence (e.g., Hines et al., 2002; Hines, Constantinescu, & Spencer, 2015).

Research on Childhood Gender-Typed Behavior and Sexual Orientation

The majority of past studies comparing childhood gender-typed behavior in individuals with different sexual orientations are retrospective. These studies, more than 60 in total, consistently reported that lesbian women and gay men recalled significantly more gender nonconforming behavior than heterosexual counterparts (reviewed in Bailey & Zucker, 1995; Zucker, 2008). Bailey and Zucker estimated that the magnitude of the difference was large, with an overall Cohen's *d* of 1.3 for men and of 1.0 for women; by Cohen's (1988) recommendation, *d* values of 0.2, 0.5, and 0.8 represent small, medium, and large effects, respectively.

Despite these consistent findings, retrospective studies can be criticized as susceptible to memory bias (e.g., Ross, 1980; Gottschalk, 2003). In response to this potential concern, Rieger, Linsenmeier, Gygax, and Bailey (2008) collected lesbian/gay and heterosexual adults' childhood home videos and had their childhood gender-typed behavior evaluated by independent raters who watched the videos and coded the gender-typicality of the behaviors shown. They observed a large and significant overall difference (*d*s = 1.0 for men and 1.2 for women) in the rated childhood gender-typed behavior between the two sexual orientation groups, suggesting that the difference is more than a product of memory bias.

Another line of evidence supporting the link between childhood gender-typed behavior and later sexual orientation comes from clinically referred children, many of whom demonstrate extreme cross-gender behavior that partially or fully meets the diagnostic criteria

for gender dysphoria/gender identity disorder in the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2000, 2013). Across 11 such studies, over 30% of extremely gender nonconforming girls and over 60% of extremely gender nonconforming boys reported some same- or both-sex sexual fantasy or behavior in adolescence or adulthood (Drummond, Bradley, Peterson-Badali, & Zucker, 2008; Green, 1987; Singh, 2012; Wallien & Cohen-Kettenis, 2008; also see Zucker & Bradley, 1995 for a summary of another 6 studies). These percentages exceed similar figures for same- or both-sex sexual fantasy or behavior in the general population (estimated as 3% of women and men; summarized from Figure 1 in Bailey et al., 2016), especially for men. Even if individuals in the general population who are mostly heterosexual are included, the prevalence rates of nonheterosexual women and men are 13% and 7% respectively, still lower than the 30% and 60% figures for extremely gender nonconforming girls and boys who would become nonheterosexual. However, because these findings are based on clinical samples, it is unknown how well they apply to the general population.

To date, only one prospective study has analyzed the relation between childhood gender-typed behavior and later sexual orientation in a general-population sample (Steensma, van der Ende, Verhulst, & Cohen-Kettenis, 2013). This study included a sample of 473 girls and 406 boys. Among these participants, 41 girls and 10 boys were classified as gender nonconforming in childhood based on a single administration of a parent-reported measure when the participants were 4 to 11 years old. When followed up in adulthood, gender nonconforming girls were up to 11 times as likely to report nonheterosexuality as all girls, and gender nonconforming boys were up to 13 times as likely to report nonheterosexuality as all boys. Taken together, converging evidence from retrospective and prospective research suggests that, on average, nonheterosexual men and women are more gender nonconforming during childhood compared to their same-sex heterosexual peers.

Despite much theoretical and empirical work, several gaps remain. First, most prior studies linking childhood gender-typed behavior to sexual orientation were either retrospective or based on clinical samples, and both of these types of studies have limitations. Further, the reliability of the results from the one prior longitudinal population-based study might be limited by the use of a 2-item measure of childhood gender nonconformity, which showed weak internal consistency ($\alpha = .41$), and by the small number of gender nonconforming children, especially boys (Steensma et al., 2013). Therefore, more prospective research, using a large sample from the general population and more reliable measures of childhood gender-typed behavior and sexual orientation, is needed.

Second, the age at which any behavioral differences between lesbian/gay and heterosexual individuals emerge is unknown. Rieger et al. (2008) estimated, in their study of home videos, that the difference appeared to manifest at around age 3 years, and that it appeared to become increasingly pronounced from early to late childhood. The possible developmental increase in the predictive power of gender nonconforming behavior resembles the development of gender-typed behavior more generally (Golombok et al., 2008; Golombok & Hines, 2002; Hines, 2015; Maccoby, 1988; Wong & Hines, 2015). The early emergence of gender-typed behavior suggests that the factors affecting gender-typed behavior and sexual orientation may come into play before the preschool years. As a consequence, it would be useful to examine the age trend in a longitudinal population-based study.

Third, few studies have evaluated relations between childhood gender-typed behavior and nonexclusive attractions (e.g., mostly heterosexual, bisexual, and mostly lesbian/gay), although nonexclusively attracted individuals outnumber exclusively lesbian/gay individuals and comprise the majority of sexual minorities (Diamond, Bonner, & Dickenson, 2015; Savin-Williams, 2014, 2016; Savin-Williams & Vrangalova, 2013). In other words, while

there is a consistent mean difference between lesbian/gay and heterosexual individuals, it is not clear if there is a monotonic increase in childhood gender nonconforming behavior across the sexual orientation spectrum from exclusively heterosexual to exclusively lesbian/gay. Previous research has yielded mixed findings. While some studies have reported a significant linear relation between childhood gender-typed behavior and later position on the sexual orientation spectrum (Alanko et al., 2010; Burri et al., 2011; Dunne, Bailey, Kirk, & Martin, 2000; Roberts, Rosario, Corliss, Koenen, & Austin, 2012), others have not (Cardoso, 2009; Steensma et al., 2013). Notably, the studies that reported a significant linear association had more participants (*N*s > 3,000) than the other studies (*N*s < 900), resulting in larger samples of each sexual orientation group and perhaps a more accurate estimate of the relation. In addition, most of these studies were retrospective, and so could be affected by biased recall.

The Current Study

The current study addresses these gaps in knowledge using a large sample from a prospective cohort study in England. This study assessed children's gender-typed behavior using a standardized measure, at three ages during the preschool period. These three time points allowed investigation of the age at which any difference related to sexual orientation might emerge. Repeated measurement also allowed us to investigate for the first time if within-individual change in gender-typed behavior over time during the preschool years predicted sexual orientation. Sexual orientation was primarily self-reported in reference to relative sexual attraction to same- and other-sex peers at age 15 years. In addition, same- and other-sex sexual activities were assessed as secondary indicators of adolescent sexual orientation at age 15 years.

Three questions were addressed using these data. First, do lesbian/gay adolescents show different levels of gender-typed behavior in childhood than heterosexual counterparts, and at what age does this difference emerge? Second, is there a monotonic relation between

the levels of childhood gender-typed behavior and later positions on the sexual orientation spectrum? Third, how does change in childhood gender-typed behavior over the preschool years relate to adolescent sexual orientation?

Method

Participants

The Avon Longitudinal Study of Parents and Children (ALSPAC) is a prospective study that recruited pregnant women who were scheduled to give birth between April 1, 1991 and December 31, 1992 in a geographically defined area in Avon, Southwest England. The eligible child cohort, including 1-year live births but excluding one random individual per twin pair and all triplets and quadruplets according to ALSPAC regulations, consists of 7,065 girls and 7,433 boys. About 80% of the ALSPAC families lived in owner occupied accommodation, 91% had a car, 79% were married couples, and 2% were non-White. Compared to the 1991 UK Census data, the ALSPAC sample is slightly more affluent and less likely to be non-White. For additional information about the ALSPAC cohort, see Boyd et al. (2013). The study website contains details of all the data, which are available through a fully searchable data dictionary: http://www.bris.ac.uk/alspac/researchers/data-access/data-dictionary/. Ethical approval for the study was obtained from the ALSPAC Ethics and Law Committee and the Local Research Ethics Committees.

The current study analyzed ALSPAC data using four time points, when the children were 2.50, 3.50, 4.75, and 15 years of age. The participation rate at each time point was 74%, 71%, 65%, and 36%, respectively. Children who had at least one valid assessment of childhood gender-typed behavior at the first three time points and a valid response of sexual orientation at the fourth time point were included in this study, N = 4,597 (2,428 girls and 2,169 boys), representing 32% of the eligible ALSPAC child cohort. Girls were more likely to be included in the current study (34%) compared to boys (29%), $\chi^2(1, n = 14498) = 44.75$

(with Yates's correction of continuity), $p < .001$, and so were White than non-White families (37% vs. 30%, respectively), $\chi^2(1, n = 11923) = 15.25$ (with Yates's correction of continuity), $p < .001$.

Measures

Childhood gender-typed behavior. Caregivers (usually the child's mother) evaluated the child's gender-typed behavior using the Preschool Activities Inventory (PSAI; Golombok & Rust, 1993a, 1993b) at three time points, when the child was 2.50, 3.50, and 4.75 years of age. The PSAI is standardized for use with children two to six years of age (Golombok & Rust, 1993b), and it shows a large sex difference in children as young as two years old (Golombok et al., 2008; Golombok & Rust, 1993a, 1993b; Wong & Hines, 2015). It consists of 12 female-typical and 12 male-typical items measuring children's preferences for toys (7 items; e.g., tea set [female-typical]), activities (11 items; e.g., playing house [female-typical]), and characteristics (6 items; e.g., enjoys rough-and-tumble play [male-typical]).

Caregivers rate the child's behavior in the past month on a 5-point Likert scale, ranging from 1 = never to 5 = very often. The total score for female-typical items is subtracted from the total score for male-typical items to form a composite score. These composite scores are then standardized using the same equation for girls and boys, with a standardization target of $M = 40$ and $SD = 10$ for girls and $M = 60$ and $SD = 10$ for boys (Golombok & Rust, 1993a, 1993b). This standardizing procedure aims to map childhood gender-typed behavior on a pseudo-*T* scale with $M = 50$ and $SD = 10$ (Golombok & Rust, 1993a). Thus, larger standardized scores indicate more male-typical behavior and/or less female-typical behavior for both girls and boys. The PSAI demonstrated good internal consistency in the current sample, αs = .82, .88, and .91, in the 2.50-, 3.50-, and 4.75-year data collections, respectively. Pearson's correlations between PSAI scores at 2.50 years and 3.50 years, 2.50 years and 4.75 years, and 3.50 years and 4.75 years were .64, .53, and .70 for

girls, respectively, and .64, .53, and .68 for boys, respectively, all *p*s < .001, demonstrating high stability for gender-typed behavior across these years. These correlations are similar to those reported previously for children in the ALSPAC sample across a similar age range (Golombok et al., 2008).

Adolescent sexual orientation. At age 15 years, adolescents reported their sexual orientation privately, on a computer, a procedure that can enhance self-disclosure of personal information (Turner et al., 1998). As in Austin et al. (2009), Remafedi, Resnick, Blum, and Harris (1992), and Saewyc, Skay, Bearinger, Blum, and Resnick, (1998), participants were asked to report their sexual orientation on a 5-point scale similar to the Kinsey scale (Kinsey, Pomeroy, & Martin, 1948): 1 = 100% heterosexual, 2 = mostly heterosexual but also attracted to the same sex, 3 = bisexual (equally attracted to both sexes), 4 = mostly lesbian/gay but also attracted to the other sex, 5 = 100% lesbian/gay, 6 = not sexually attracted to either sex, 7 = not sure. Participants who selected 6 (*n* = 13) or 7 (*n* = 69) were removed from analyses involving sexual orientation, because (a) there are no clear predictions regarding differences in childhood gender-typed behavior between adolescents with an asexual or questioning orientation and those with a heterosexual orientation and (b) the majority of asexual and unsure adolescents are likely to self-identify as heterosexual in late adolescence or adulthood (Ott, Corliss, Wypij, Rosario, & Austin, 2011; Savin-Williams & Joyner, 2014a), so that it does not allow reliable comparisons of asexual or unsure adolescents to heterosexual adolescents. This 5-point measure of sexual orientation has shown similarly good stability (i.e., test-retest reliability) in adolescents and in young adults (Ott et al., 2011), expected associations with the sex of sexual partners among adolescents (Saewyc et al., 1998), and relatively low nonresponse rate among adolescents compared to sexual orientation defined on other components (e.g., sexual fantasy; Saewyc et al., 2004).

Thus, age 15 years appears to be a good age to start assessing self-reported sexual orientation in a longitudinal study.

Considering recent debates about the reliability of measuring adolescent sexual orientation (Katz-Wise, Calzo, Li, & Pollitt, 2015; Li, Katz-Wise, & Calzo, 2014; Savin-Williams & Joyner, 2014a, 2014b), data on sexual behavior were also analyzed as a reliability check. Sexual behavior was assessed using the Adolescent Sexual Activities Index (ASAI; Hansen, Paskett, & Carter, 1999). Fourteen sexual activities were presented in the order from low (e.g., "hugging") to high (e.g., "having sexual intercourse") intensity (Tables 5 & 6). Adolescents reported whether or not they had had each of the experiences in the past year. Two stopping rules were used: If participants (1) answered "no" or skipped inquiries about "cuddling," "laying down together," or "being undressed with private parts showing," or (2) skipped inquiries about "touching or fondling another young person's private parts" or "private parts being touched or fondled," they did not progress to the rest of the questions. The ASAI showed good internal consistency in this study, $\alpha = .93$.

In addition to occurrence, adolescents reported the sex(es) of the person(s) with whom they engaged in each sexual activity. For the purpose of the current study, adolescents who reported exclusive other-sex contacts in a given sexual activity received a score of 0 on that activity, and those who reported any same-sex contacts (including same-sex and both-sex contacts) in a given sexual activity received a score of 1 on that activity. Comparisons were not made between adolescents who had any same-sex (or other-sex) sexual contacts and those who had no sexual contacts, because these two groups may not reflect differences in sexual orientation, but may rather reflect differences in other factors such as the availability of sexual partners. Also, because few adolescents had exclusive same-sex sexual contacts, they were not distinguished from those with both-sex sexual contacts in the comparisons of childhood gender-typed behavior.

Missing Data

At the scale level, the four key variables had 2–8% missingness due to item nonresponse (Table 1). These missing data were handled by full information maximum likelihood in Mplus 7 (Muthén & Muthén, 1998–2015) in the latent growth modeling and by multiple imputation in Amelia II 1.7.3 (Honaker, King, & Blackwell, 2012) followed by Zelig 4.2-1 (Choirat, Honaker, Imai, King, & Lau, 2015) to pool the imputed data in the ordinary least squares regression.

Results

Were There Differences in the Levels of Childhood Gender-Typed Behavior Between Lesbian/Gay and Heterosexual Adolescents?

Sample size, mean, standard deviation, and range of each study variable are reported in Table 1. To fully use the longitudinal assessments of childhood gender-typed behavior, latent growth modeling was performed (Little, 2013). Latent intercept was separated from latent slope, with the former estimating the mean level of childhood gender-typed behavior at a chosen time point, and the latter estimating the rate of within-individual change from the first to the last assessment. Previous research has found that children who were gender nonconforming at age 3.50 years became increasingly so later in childhood (Golombok et al., 2008); consequently, lesbian/gay individuals may exhibit more gender nonconforming behavior than heterosexual counterparts, because they were gender nonconforming to start with, or because they became more gender nonconforming over time. Distinguishing latent intercept from latent slope allowed the investigation of relations between these individual differences in the development of gender-typed behavior and adolescent sexual orientation.

Latent growth models were fitted separately by sex, with the standardized PSAI scores at ages 2.50, 3.50, and 4.75 years used as indicators. Factor loadings on the latent intercept were all fixed at 1; those on the latent slope were fixed by the time intervals in years

between assessments. The latent intercept was alternately set to the three ages, so that the mean level of gender-typed behavior was estimated for each age (Biesanz, Deeb-Sossa, Papadakis, Bollen, & Curran, 2004). All other parameters were freely estimated. Table 2 shows that latent growth models fit well with the developmental trajectories of preschool gender-typed behavior in girls and boys. All estimates presented in Table 2 were significantly different from 0 at $p < .001$, two-tailed. The estimates of latent intercepts and slope indicated that from ages 2.50 to 4.75 years, girls and boys on average increasingly conformed to the behavioral norm of their own gender. The reproduced values of latent intercepts and slope for each child were then predicted by adolescent sexual orientation and sexual activities in ordinary least squares regression. Using the same set of latent intercepts and slope, rather than estimating them in individual conditioned latent growth models (i.e., controlling for sexual orientation or sexual activities while estimating latent growth factors), ensures high accuracy in the estimates of latent intercepts and slope, especially when the sample size is small (e.g., comparing adolescents who had oral sex with any same-sex partners to those with exclusively other-sex partners in Tables 5 & 6).

Ordinary least squares regression demonstrated differences in the levels of childhood gender-typed behavior between lesbian/gay and heterosexual adolescents (Tables 3 & 4). Bonferroni corrections were applied to control for the inflated family-wise error rate due to multiple comparisons. Starting at age 3.50 years in girls and 2.50 years in boys, pre-lesbian/gay children exhibited significantly higher levels of gender nonconforming behavior than same-sex pre-heterosexual peers. By Cohen's (1988) benchmarks, the differences were large from 3.50 years of age, ds > 0.8 (Tables 3 & 4).

To illustrate the size of the difference, histograms of the levels of gender-typed behavior at ages 2.50, 3.50, and 4.75 years were drawn as a function of the sexual orientation group (lesbian/gay or heterosexual) at age 15, for girls and boys (Figure 1). According to the

frequency distributions, 6%, 6%, and 19% of lesbian girls scored above 56.45 on the PSAI (equating to the 95th percentile in the target standardized distribution with an *M* of 40 and an *SD* of 10) at ages 2.50, 3.50, and 4.75 years (and thus appeared to be extremely gender nonconforming), respectively, while only 0.8%, 0.5%, and 1% of heterosexual girls did so respectively. Similarly, 0%, 4%, and 13% of gay boys scored below 43.55 on the PSAI (equating to the 5th percentile in the target standardized distribution with an *M* of 60 and an *SD* of 10) at ages 2.50, 3.50, and 4.75 years (and thus appeared to be extremely gender nonconforming), respectively, while the corresponding percentages for heterosexual boys were 0.4%, 0.2%, and 0.5%, respectively.

Parallel analyses revealed a significant group difference in the levels of childhood gender-typed behavior, starting at age 2.50 years, by the sex(es) of partner(s) with whom adolescents had sexual contacts (Tables 5 & 6). Overall, 15-year-old adolescents who reported certain types of sexual contacts with any same-sex partners showed higher levels of gender nonconformity than same-sex peers who reported corresponding sexual contacts with other-sex partners only. The effect sizes of the differences varied, with ranges of *d*s of [0.01, 1.04] in girls (median $d = 0.24$) and [-1.54, 0.03] in boys (median $d = -0.36$). The most consistently predicted sexual activities by the levels of childhood gender-typed behavior were ones of an intermediate to high level of intensity, such as kissing and being kissed on the mouth, laying down together, touching partners under clothes, touching or fondling partners' private parts, private parts being touched or fondled, and having oral sex (Tables 5 & 6). A larger number of significant differences were observed in boys than in girls (28 versus 18; Tables 5 & 6). Moreover, the levels of gender-typed behavior at older ages seemed to relate to adolescents' sexual behavior more strongly than the levels of gender-typed behavior at age 2.50 years, especially in boys (Tables 6).

Was There a Monotonic Relation Between the Levels of Childhood Gender-Typed Behavior and the Sexual Orientation Spectrum?

From self-identified heterosexual to bisexual to lesbian/gay, adolescents demonstrated a monotonic increase in the levels of gender nonconforming behavior at ages 3.50 and 4.75 years, although not at age 2.50 years, after Bonferroni corrections (Tables 3 & 4). Further division of sexual orientation into five categories saw similar monotonic associations with the levels of gender-typed behavior at older ages, after Bonferroni corrections (Tables 3 & 4). These associations were all linear (Tables 3 & 4).

What Was the Relation Between Change in Childhood Gender-Typed Behavior Over Time and Adolescent Sexual Orientation?

Ordinary least squares regression demonstrated that change in gender-typed behavior during preschool years also related significantly to adolescent sexual orientation. Specifically, heterosexual adolescents increasingly conformed to their own gender norms from ages 2.50 to 4.75 years, whereas nonheterosexual adolescents became gender conforming at a slower rate than heterosexual counterparts or became more gender nonconforming over the preschool years (Tables 3 & 4). The significant differences in the latent slope between heterosexual and lesbian/gay adolescents approximated a large size in girls (d = 0.72) and in boys (d = -1.09). When sexual orientation was coded as a spectrum (either as three or five groups) from heterosexual to lesbian/gay, the latent slope linearly increased in girls and linearly decreased in boys, suggesting that compared to heterosexual adolescents, bisexuals became gender conforming at a lower rate, and lesbian/gay individuals became gender conforming at an even lower rate, or became more gender nonconforming before age 5 years. After controlling for average levels of gender-typed behavior, change in gender-typed behavior continued to significantly predict adolescent sexual orientation in boys in the same

manner as before, but did not predict adolescent sexual orientation in girls, regardless of how adolescent sexual orientation was coded (Table S3).

Results for sexual activities suggested a similar picture: Adolescent girls who had same-sex sexual contacts rarely differed significantly in change in childhood gender-typed behavior during preschool years from girls who had exclusively other-sex sexual contacts (Table 5). In contrast, adolescent boys who had same-sex contacts in some activities became gender conforming at a lower rate or became more gender nonconforming during preschool years than boys who had exclusively other-sex contacts in those activities (Table 6).

Discussion

This study examined the association between childhood gender-typed behavior and adolescent sexual orientation, in a large sample from a longitudinal, population-based study. The findings suggest that self-identified lesbian/gay adolescents are more likely than heterosexual counterparts to have shown high levels of gender nonconforming behavior in childhood. This significant and large group difference was seen before age 5 years. Compared to heterosexual adolescent girls, lesbian girls were 12–19 times as likely to display extreme levels of gender nonconforming behavior at ages 3.50 and 4.75 years; compared to heterosexual adolescent boys, gay boys were 20–26 times as likely to display extreme levels of gender nonconforming behavior at ages 3.50 and 4.75 years. Similarly, adolescents who reported any same-sex sexual contacts (especially activities of an intermediate to high level of intensity) also reported significantly higher levels of gender nonconforming behavior, starting at age 2.50 years but more strongly and consistently at older ages (especially in boys), than adolescents who had exclusively other-sex sexual contacts. In addition, the levels of childhood behavioral gender nonconformity increased monotonically across the sexual orientation spectrum from exclusively heterosexual to exclusively lesbian/gay, for both girls and boys. Finally, we explored whether change in gender-typed behavior across the pre-

school years related significantly to adolescent sexual orientation, and to sexual activities, and we found this to be the case, particularly in boys.

The findings in this study converge with those of previous studies to support a difference in the levels of childhood gender nonconformity between groups of self-identified lesbian/gay and heterosexual individuals. Further, the size of this group difference is uniformly large: In retrospective studies, Cohen's *ds* of 1.0 or larger have been observed (e.g., Bailey & Zucker, 1995; Rieger et al., 2008), exceeding the value of 0.8 that is considered to be a large effect (Cohen, 1988). While retrospective studies are criticized as subject to self-recall bias, the only existing longitudinal study also reported a large group difference (odds ratios equaled 6.6 for women and 13.7 for men, corresponding to *d*s of 1.0 and 1.4; see Card, 2010, p. 119, for the equation that converts odds ratio to *d*; Steensma et al., 2013). Our *d* values of 0.9 for girls and 1.2 for boys in a longitudinal, population-based sample, when gender-typed behavior was measured at age 4.75 years, are similar to Steensma et al.'s findings. The prospective design of the current study and of Steensma et al.'s suggests that the connection is not merely a product of self-recall bias due to lesbian and gay people's internalized societal stereotypes (Ross, 1980; Gottschalk, 2003). It should also be noted that, among potential childhood behavioral predictors of sexual orientation (e.g., familial factors such as the parent-child relationship), gender-typed behavior appears to be the strongest one, especially when predicting dichotomous differences between heterosexual and lesbian/gay individuals (e.g., Bell, Weinberg, & Hammersmith, 1981; also reviewed in Bailey et al., 2016).

Comparisons between two sexual activity groups yielded, with occasional exceptions, smaller magnitudes of differences in childhood gender-typed behavior than comparisons between two sexual orientation groups, according to Cohen's *d*s (Tables 4 & 5). This may have occurred because adolescent sexual activity is not a perfect indicator of adolescent

sexual orientation. For example, some self-identified nonheterosexual adults recall having other-sex sexual contacts during adolescence (Herdt & Boxer, 1996; Rosario et al., 1996; Savin-Williams, 1998), and some self-identified heterosexual adults recall having same-sex sexual contacts during adolescence (Knight & Hope, 2012; Morgan, 2012; Morgan & Thompson, 2011).

The present findings may have implications for understanding the factors that influence individual variability in sexual orientation. We found that the differences in levels of gender-typed behavior among sexual orientation groups emerged early, at as young as 2.50 to 3.50 years. This finding resembles the results of Rieger et al.'s (2008) study, which reported that lesbian/gay individuals were more gender nonconforming than heterosexual individuals starting from around age 3 years. In the current study, however, this difference was statistically nonsignificant or smaller at age 2.50 years than it was at age 3.50 or 4.75 years. This smaller effect at age 2.50 years may reflect reduced sensitivity of the measure of gender-typed play at the youngest age, given that sex differences in childhood gender-typed play become more pronounced (and thus more observable) across childhood (Hines, 2015; Wong & Hines, 2015). Nevertheless, the early emerging differences in gender-typed behavior among sexual orientation groups suggest that any common factors affecting both traits are likely to be present early in development.

The current study found that not only levels of gender nonconformity, but also change in gender-typed behavior across the preschool years related significantly to later sexual orientation, especially in boys. When heterosexual individuals, who comprised the majority of participants, increasingly conformed to respective gender norms, nonheterosexual individuals appeared to conform less, or became more nonconforming, over time. The link between change in gender-typed behavior over time and adolescent sexual orientation is unlikely to be caused by social factors, because there is widespread social encouragement to

conform to gender roles (Eagly, Wood, & Diekman, 2000; Eccles, Jacobs, & Harold, 1990), and childhood gender nonconforming behavior can be associated with victimization experiences (Katz-Wise & Hyde, 2012; Roberts, Rosario, Slopen, Calzo, & Austin, 2013), which should discourage pre-nonheterosexual children from diverging from gender norms. Nevertheless, how developmental change in childhood gender-typed behavior relates to later sexual orientation merits further investigation, because evidence from this study is less supportive of such a link in girls than in boys, and because we only assessed gender-typed behavior across a short period of time.

Finally, the current study found that childhood gender nonconformity was monotonically associated with same-sex sexual orientation within each sex. This finding is consistent with predictions based on evidence that gendered traits may be correlated because they share a common, monotonic influence of early androgen exposure (Hines, 2011). For example, the extent to which a female with CAH prefers male-typical over female-typical childhood activities, and female over male sexual partners both appear to be monotonically influenced by the degree of prenatal androgen exposure due to CAH (Frisén et al., 2009; Meyer-Bahlburg, Dolezal, Baker, & New, 2008). Similarly, in typically-developing girls and boys, there is evidence that childhood gender-typed behavior is monotonically related to early androgen concentrations (Hines et al., 2002; Lamminmäki et al., 2012; Pasterski et al., 2015), although little is known about the relationship between early androgen levels and sexual orientation in typically-developing individuals.

Results of the current study should be interpreted with some limitations in mind. First, while the majority of prior studies relating childhood gender nonconformity to later sexual orientation measured sexual orientation in adulthood (with the exception of Rieger & Savin-Williams, 2012), the current study measured sexual orientation in adolescence. Because the number of people who identify as nonheterosexual, especially as lesbian/gay, increases from

adolescence to adulthood (Austin et al., 2009; Remafedi et al., 1992), it is possible that assessments of our cohort at later ages would produce somewhat different results. In addition, because our study focused on adolescents, some of our participants were at earlier pubertal stages than others. Nevertheless, in the current study the significance levels for the relations between childhood gender-typed behavior and adolescent sexual orientation remained largely unchanged after controlling for pubertal development statuses (Tables S4 & S5). Second, ongoing debates question whether adolescents accurately report their sexual orientation (Katz-Wise et al., 2015; Li et al., 2014; Savin-Williams & Joyner, 2014a, 2014b). Although our measurement of sexual orientation at age 15 years appeared to be sufficiently reliable to detect similar relations to childhood gender nonconformity to those seen in prior studies, future research might usefully study this cohort at older ages. Future studies also might usefully explore the connection between childhood gender-typed behavior and sexual orientation measured using methods other than self-reports, such as pupil dilation and genital arousal (e.g., Rieger, Savin-Williams, Chivers, & Bailey, 2015).

Conclusion

By age 2.50 to 3.50 years, children's gender-typed behavior significantly predicts future sexual orientation. Children who exhibit more gender nonconformity in regard to toys, playmates, and activities are more likely to later report more same-sex and/or less other-sex sexual attraction and behavior. The current results converge with other lines of retrospective and prospective research to suggest that childhood gender nonconforming behavior is a consistent early predictor of future nonheterosexual orientations. This observed relation may be partly driven by other factors, such as early androgen exposure or common genes, that affect behavior early in development.

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Table 1
Descriptive Statistics of Key Variables by Sex

	Girls				Boys			
	n	*M*	*SD*	Range	*n*	*M*	*SD*	Range
Sexual orientation at age 15 years[a]	2,428	1.17	0.48	1–5	2,169	1.13	0.48	1–5
Gender-typed behavior at age 2.50 years[b]	2,241	40.99	8.46	8.65–71.35	2,010	59.87	8.24	27.35–92.25
Gender-typed behavior at age 3.50 years[b]	2,360	37.08	9.31	4.25–72.45	2,125	61.54	8.69	20.75–95.55
Gender-typed behavior at age 4.75 years[b]	2,228	35.28	9.51	4.25–90.05	2,026	63.42	8.78	16.35–93.55

[a]1 = 100% heterosexual; 5 = 100% lesbian/gay.
[b]Larger scores represent higher levels of male-typical behavior and/or lower levels of female-typical behavior.

Table 2

Latent Linear Growth Models of Childhood Gender-Typed Behavior by Sex With Intercepts Fixed at Different Ages

	Intercept		Slope		Intercept-slope
Intercept fixed at	Mean	Variance	Mean	Variance	Covariance
Girls	Model fit: $\chi^2(1) = 113.63$, $p < .001$; CFI = .956; TLI = .867; RMSEA [90% CI] = .22 [.18, .25]				
2.50 years	40.55 (0.18)	55.19 (2.61)	-2.42 (0.09)	11.53 (1.02)	-5.93 (1.12)
3.50 years	38.12 (0.16)	54.86 (1.91)	-2.42 (0.09)	11.54 (1.02)	5.60 (0.81)
4.75 years	35.09 (0.20)	86.89 (3.89)	-2.42 (0.09)	11.54 (1.02)	20.02 (1.70)
Boys	Model fit: $\chi^2(1) = 0.90$, $p = .342$; CFI > .999; TLI > .999; RMSEA [90% CI] = .00 [.00, .06]				
2.50 years	59.83 (0.18)	52.39 (8.78)	1.61 (0.08)	8.78 (0.93)	-6.31 (1.07)
3.50 years	61.43 (0.16)	48.55 (1.77)	1.61 (0.08)	8.78 (0.93)	2.47 (0.73)
4.75 years	63.44 (0.19)	68.45 (3.34)	1.61 (0.08)	8.78 (0.93)	13.45 (1.47)

Note. Each row represents an individual latent growth model, but the model fit remained the same within each sex regardless how the intercept was fixed. All estimates in this table were significantly different from 0 at $p < .001$, two-tailed. Values outside and inside the parentheses represent unstandardized estimates and standard errors. CFI = comparative fit index. TLI = Tucker–Lewis index. RMSEA = root mean square error of approximation. CI = confidence interval.

Table 3
Latent Growth Factors of Gender-Typed Behavior During Preschool Years by Sexual Orientation at Age 15 Years in Girls

		Intercept at age 2.50 years[a]		Intercept at age 3.50 years[a]		Intercept at age 4.75 years[a]		Slope[b]	
Sexual orientation	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
2-group[c]									
Heterosexual[d]	2,366	40.47	6.55	38.03	6.96	34.99	8.82	-2.44	2.81
Lesbian[e]	16	44.11	8.03	43.70	8.87	43.18	11.69	-0.41	3.78
d[f]		0.56		0.81		0.93		0.72	
3-group[g]									
Heterosexual[d]	2,366	40.47	6.55	38.03	6.96	34.99	8.82	-2.44	2.81
Bisexual	46	43.34	7.07	40.90	8.51	37.84	11.32	-2.45	3.14
Lesbian[e]	16	44.11	8.03	43.70	8.87	43.18	11.69	-0.41	3.78
5-group[h]									
100% heterosexual	2,094	40.27	6.56	37.83	6.95	34.78	8.78	-2.44	2.80
Mostly heterosexual	272	42.04	6.24	39.61	6.84	36.57	8.95	-2.43	2.90
Bisexual	46	43.34	7.07	40.90	8.51	37.84	11.32	-2.45	3.14
Mostly lesbian	12	42.68	8.22	41.30	7.48	39.58	8.59	-1.37	3.40
100% lesbian	4	48.42	6.43	50.89	9.81	53.97	14.34	2.47	3.79

[a]Larger scores represent higher levels of male-typical behavior and/or lower levels of female-typical behavior.
[b]Above zero: larger scores represent a larger increase in male-typical behavior and/or a larger decrease in female-typical behavior; below zero: smaller scores represent a larger increase in female-typical behavior and/or a larger decrease in male-typical behavior.
[c]Linear regression with Bonferroni correction ($\alpha = .05/4 = .013$, two-tailed) indicated a significant difference between heterosexual and lesbian girls in the intercepts of gender-typed behavior at age 3.50 years, $B = 5.66$, $SE = 1.75$, $p < .001$, and at age 4.75 years, $B = 8.19$, $SE = 2.22$, $p < .001$, and in the slope of gender-typed behavior during preschool years, $B = 2.02$, $SE = 0.71$, $p = .004$.
[d]Comprising 100% heterosexual and mostly heterosexual.
[e]Comprising mostly lesbian and 100% lesbian.
[f]Cohen's *d* was pooled following Rubin's (1987) rule. Similarly to Bailey and Zucker (1995), Hedges's (1982; Formula 4) unbiasing correction was applied.
[g]Orthogonal polynomial contrasts with Bonferroni correction ($\alpha = .05/8 = .006$, two-tailed) indicated a significant linear effect of sexual orientation groups in girls on the intercepts of gender-typed behavior at age 3.50 years, $B = 4.01$, $SE = 1.24$, $p < .001$, and at age 4.75 years, $B =$

5.79, *SE* = 1.58, $p < .001$, and on the slope of gender-typed behavior during preschool years, *B* = 1.43, *SE* = 0.50, $p = .004$. No other significant linear effects or any quadratic effects were detected, *p*s > .027 (see Table S1 for more information).

[h]Orthogonal polynomial contrasts with Bonferroni correction ($\alpha = .05/16 = .003$, two-tailed) indicated a significant linear effect of sexual orientation groups in girls on the intercepts of gender-typed behavior at age 3.50 years, *B* = 8.79, *SE* = 2.30, $p = .001$, and at age 4.75 years, *B* = 13.08, *SE* = 2.92, $p < .001$, and on the slope of gender-typed behavior during preschool years, *B* = 3.44, *SE* = 0.93, $p < .001$. No other significant linear effects or any quadratic, cubic, or quartic effects were detected, *p*s > .004 (see Table S1 for more information).

Table 4

Latent Growth Factors of Gender-Typed Behavior During Preschool Years by Sexual Orientation at Age 15 Years in Boys

		Intercept at age 2.50 years[a]		Intercept at age 3.50 years[a]		Intercept at age 4.75 years[a]		Slope[b]	
Sexual orientation	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
2-group[c]									
Heterosexual[d]	2,117	59.90	6.42	61.56	6.47	63.63	7.53	1.66	2.24
Gay[e]	24	56.45	6.05	55.66	6.82	54.67	9.21	-0.79	3.04
d[f]		-0.54		-0.91		-1.19		-1.09	
3-group[g]									
Heterosexual[d]	2,117	59.90	6.42	61.56	6.47	63.63	7.53	1.66	2.24
Bisexual	28	57.34	8.70	57.12	9.32	56.84	11.56	-0.22	3.40
Gay[e]	24	56.45	6.05	55.66	6.82	54.67	9.21	-0.79	3.04
5-group[h]									
100% heterosexual	1,981	60.01	6.41	61.69	6.47	63.79	7.53	1.68	2.22
Mostly heterosexual	136	58.32	6.37	59.64	6.12	61.28	7.16	1.31	2.51
Bisexual	28	57.34	8.70	57.12	9.32	56.84	11.56	-0.22	3.40
Mostly gay	13	55.99	5.90	55.35	6.85	54.54	9.79	-0.65	3.47
100% gay	11	56.99	6.47	56.03	7.10	54.83	8.95	-0.96	2.60

[a]Larger scores represent higher levels of male-typical behavior and/or lower levels of female-typical behavior.

[b]Above zero: larger scores represent a larger increase in male-typical behavior and/or a larger decrease in female-typical behavior; below zero: smaller scores represent a larger increase in female-typical behavior and/or a larger decrease in male-typical behavior.

[c]Linear regression with Bonferroni correction ($\alpha = .05/4 = .013$, two-tailed) indicated a significant difference between heterosexual and gay boys in the intercepts of gender-typed behavior at age 2.50 years, $B = -3.45$, $SE = 1.32$, $p = .009$, at age 3.50 years, $B = -5.90$, $SE = 1.33$, $p < .001$, and at age 4.75 years, $B = 8.96$, $SE = 1.55$, $p < .001$, and in the slope of gender-typed behavior during preschool years, $B = -2.45$, $SE = 0.46$, $p < .001$.

[d]Comprising 100% heterosexual and mostly heterosexual.

[e]Comprising mostly gay and 100% gay.

[f]Cohen's *d* was pooled following Rubin's (1987) rule. Similarly to Bailey and Zucker (1995), Hedges's (1982; Formula 4) unbiasing correction was applied.

[g]Orthogonal polynomial contrasts with Bonferroni correction ($\alpha = .05/8 = .006$, two-tailed) indicated a significant linear effect of sexual orientation groups in boys on the intercepts of gender-typed behavior at age 3.50 years, $B = -4.17$, $SE = 0.95$, $p < .001$, and at age 4.75 years, $B =$

-6.33, *SE* = 1.11, $p < .001$, and on the slope of gender-typed behavior during preschool years, *B* = -1.73, *SE* = 0.33, $p < .001$. No other significant linear effects or any quadratic effects were detected, *p*s > .009 (see Table S1 for more information).

[h]Orthogonal polynomial contrasts with Bonferroni correction ($\alpha = .05/16 = .003$, two-tailed) indicated a significant linear effect of sexual orientation groups in boys on the intercepts of gender-typed behavior at age 3.50 years, *B* = -4.94, *SE* = 1.38, $p < .001$, and at age 4.75 years, *B* = -7.80, *SE* = 1.61, $p < .001$, and on the slope of gender-typed behavior during preschool years, *B* = -2.29, *SE* = 0.48, $p < .001$. No other significant linear effects or any quadratic, cubic, or quartic effects were detected, *p*s > .053 (see Table S1 for more information).

Table 5
Latent Growth Factors of Gender-Typed Behavior During Preschool Years by Sexual Activities at Age 15 Years in Girls Who Had Sexual Contacts

		Intercept at age 2.50 years[a]		Intercept at age 3.50 years[a]		Intercept at age 4.75 years[a]		Slope[b]	
Sexual activity	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Hug									
Exclusive other-sex contacts	173	40.26	6.95	37.74	6.89	34.58	8.16	-2.52	2.68
Any same-sex contacts	2,231	40.55	6.55	38.13	7.04	35.10	8.98	-2.42	2.85
d		0.04		0.06		0.06		0.04	
Hold hands									
Exclusive other-sex contacts	864	40.39	6.54	37.75	6.86	34.45	8.58	-2.64[c]	2.73
Any same-sex contacts	1,209	40.47	6.55	38.19	7.02	35.33	9.00	-2.28	2.90
d		0.01		0.06		0.09		0.13	
Spend time alone									
Exclusive other-sex contacts	476	40.13	6.63	37.55	6.99	34.33	8.76	-2.58	2.79
Any same-sex contacts	1,775	40.56	6.56	38.17	6.99	35.18	8.87	-2.39	2.82
d		0.07		0.09		0.10		0.06	
Kiss on the mouth									
Exclusive other-sex contacts	1,483	40.15[c]	6.55	37.70[c]	6.87	34.64[c]	8.63	-2.45	2.79
Any same-sex contacts	366	41.80	6.72	39.55	7.43	36.74	9.68	-2.25	3.02
d		0.25		0.27		0.24		0.07	
Be kissed on the mouth									
Exclusive other-sex contacts	1,486	40.34[c]	6.57	37.93[c]	6.95	34.92[c]	8.77	-2.41	2.81
Any same-sex contacts	266	41.49	6.78	39.31	7.32	36.59	9.40	-2.17	3.00
d		0.17		0.20		0.19		0.08	
Cuddle									
Exclusive other-sex contacts	1,363	40.35	6.58	37.85	6.95	34.73	8.79	-2.50	2.84
Any same-sex contacts	565	40.76	6.40	38.44	7.06	35.54	9.20	-2.32	2.90
d		0.06		0.08		0.09		0.06	
Lay down together									

Exclusive other-sex contacts	1,159	40.23[c]	6.58	37.83[c]	6.89	34.83	8.63	-2.40	2.77
Any same-sex contacts	365	41.32	6.28	38.89	6.83	35.85	8.83	-2.43	2.82
d		0.17		0.15		0.12		-0.01	
Be touched under clothes									
Exclusive other-sex contacts	1,191	40.50	6.55	38.06	6.87	35.01	8.61	-2.44	2.77
Any same-sex contacts	50	42.07	8.05	39.82	9.15	37.00	11.89	-2.25	3.48
d		0.24		0.25		0.23		0.07	
Touch under clothes									
Exclusive other-sex contacts	1,018	40.46	6.61	38.02[c]	6.88	34.97[c]	8.54	-2.44	2.73
Any same-sex contacts	49	42.51	8.03	41.03	9.26	39.18	12.25	-1.48	3.66
d		0.31		0.43		0.48		0.35	
Be undressed with private parts showing									
Exclusive other-sex contacts	742	40.47[c]	6.56	38.02	6.87	34.96	8.56	-2.45	2.73
Any same-sex contacts	59	42.99	6.58	39.98	7.85	36.22	10.72	-3.01	3.28
d		0.39		0.28		0.14		-0.20	
Touch or fondle private parts									
Exclusive other-sex contacts	700	40.54[c]	6.62	38.09[c]	6.94	35.02	8.66	-2.46	2.77
Any same-sex contacts	26	44.06	7.15	41.93	9.07	39.25	12.47	-2.14	3.50
d		0.53		0.55		0.48		0.11	
Private parts be touched or fondled									
Exclusive other-sex contacts	710	40.53[c]	6.54	38.04[c]	6.85	34.93	8.58	-2.49	2.76
Any same-sex contacts	25	44.93	7.44	42.41	9.05	39.25	12.14	-2.52	3.38
d		0.67		0.63		0.50		-0.01	
Have oral sex									
Exclusive other-sex contacts	570	40.65[c]	6.48	38.10[c]	6.78	34.91[c]	8.55	-2.55	2.80
Any same-sex contacts	11	47.40	8.70	45.18	11.80	42.40	16.49	-2.23	4.34
d		1.04		1.03		0.86		0.11	
Have sexual intercourse									
Exclusive other-sex contacts	483	40.56	6.57	38.06	6.79	34.93	8.43	-2.50	2.75
Any same-sex contacts	6	43.39	8.90	40.73	8.70	37.40	8.48	-2.66	0.45

	d	0.43	0.39	0.29	-0.07

Note. Girls who did not engage in a given sexual activity or did not indicate the sex(es) of the partner(s) were excluded from the analysis. Cohen's *d* was pooled following Rubin's (1987) rule. Similarly to Bailey and Zucker (1995), Hedges's (1982; Formula 4) unbiasing correction was applied.

[a]Larger scores represent higher levels of male-typical behavior and/or lower levels of female-typical behavior.

[b]Above zero: larger scores represent a larger increase in male-typical behavior and/or a larger decrease in female-typical behavior; below zero: smaller scores represent a larger increase in female-typical behavior and/or a larger decrease in male-typical behavior.

[c]Value significantly differs from that in the row immediately below, after Bonferroni correction ($\alpha = .05/4 = .013$, two-tailed). See Table S2 for more information.

Table 6
Latent Growth Factors of Gender-Typed Behavior During Preschool Years by Sexual Activities at Age 15 Years in Boys Who Had Sexual Contacts

Sexual activity	*n*	Intercept at age 2.50 years[a]		Intercept at age 3.50 years[a]		Intercept at age 4.75 years[a]		Slope[b]	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Hug									
Exclusive other-sex contacts	1,121	59.85	6.67	61.45	6.77	63.45	7.89	1.60	2.29
Any same-sex contacts	949	59.85	6.27	61.51	6.37	63.60	7.57	1.66	2.32
d		0.00		0.01		0.02		0.03	
Hold hands									
Exclusive other-sex contacts	1,531	60.10	6.54	61.74	6.59	63.78	7.67	1.64	2.27
Any same-sex contacts	161	59.36	6.42	60.79	6.83	62.57	8.51	1.43	2.60
d		-0.11		-0.14		-0.16		-0.09	
Spend time alone									
Exclusive other-sex contacts	920	60.40[c]	6.67	62.00[c]	6.77	64.00[c]	7.79	1.60	2.17
Any same-sex contacts	927	59.41	6.34	61.02	6.48	63.02	7.76	1.60	2.39
d		-0.15		-0.15		-0.13		0.00	
Kiss on the mouth									
Exclusive other-sex contacts	1,448	60.29[c]	6.50	61.95[c]	6.53	64.01[c]	7.58	1.65	2.24
Any same-sex contacts	69	58.21	5.81	59.35	6.32	60.78	8.62	1.14	3.07
d		-0.32		-0.40		-0.42		-0.22	
Be kissed on the mouth									
Exclusive other-sex contacts	1,361	60.37[c]	6.46	62.02[c]	6.50	64.07[c]	7.53	1.64	2.22
Any same-sex contacts	65	58.62	5.95	59.77	6.76	61.22	9.35	1.16	3.21
d		-0.27		-0.34		-0.37		-0.21	
Cuddle									
Exclusive other-sex contacts	1,466	60.11	6.49	61.72	6.58	63.73[c]	7.69	1.61	2.27
Any same-sex contacts	104	59.18	6.26	60.23	6.65	61.55	8.67	1.06	2.96
d		-0.14		-0.22		-0.28		-0.24	
Lay down together									

Exclusive other-sex contacts	1,048	60.55	6.54	62.17[c]	6.54	64.20[c]	7.48	1.62	2.17
Any same-sex contacts	82	58.95	6.30	60.11	7.14	61.56	9.60	1.16	3.10
d		-0.24		-0.31		-0.34		-0.21	
Be touched under clothes									
Exclusive other-sex contacts	843	60.69[c]	6.61	62.35[c]	6.65	64.42[c]	7.60	1.65[c]	2.14
Any same-sex contacts	34	57.40	4.74	57.74	5.47	58.16	8.79	0.33	3.67
d		-0.50		-0.70		-0.82		-0.60	
Touch under clothes									
Exclusive other-sex contacts	849	60.58[c]	6.59	62.24[c]	6.61	64.33[c]	7.54	1.67[c]	2.13
Any same-sex contacts	34	57.41	4.59	57.73	5.76	58.14	9.51	0.32	3.87
d		-0.49		-0.69		-0.81		-0.61	
Be undressed with private parts showing									
Exclusive other-sex contacts	544	60.84	6.76	62.52	6.80	64.62[c]	7.75	1.68[c]	2.15
Any same-sex contacts	38	59.43	5.75	60.02	7.18	60.75	10.51	0.59	3.56
d		-0.21		-0.37		-0.49		-0.48	
Touch or fondle private parts									
Exclusive other-sex contacts	513	61.01[c]	6.78	62.73	6.89	64.87[c]	7.90	1.72[c]	2.16
Any same-sex contacts	26	57.41	4.88	56.79	5.39	56.01	8.49	-0.62	3.60
d		-0.54		-0.87		-1.12		-1.04	
Private parts be touched or fondled									
Exclusive other-sex contacts	498	61.07	6.72	62.78[c]	6.81	64.91[c]	7.78	1.71[c]	2.13
Any same-sex contacts	26	59.11	6.64	57.91	7.23	56.42	9.94	-1.19	3.59
d		-0.29		-0.70		-1.05		-1.26	
Have oral sex									
Exclusive other-sex contacts	413	61.30[c]	6.75	62.94[c]	6.79	64.99[c]	7.70	1.64[c]	2.11
Any same-sex contacts	22	57.34	4.57	56.58	5.47	55.63	8.88	-0.76	3.66
d		-0.60		-0.95		-1.21		-1.09	
Have sexual intercourse									
Exclusive other-sex contacts	322	61.19	6.82	62.78[c]	6.93	64.76[c]	7.94	1.59[c]	2.17
Any same-sex contacts	8	60.07	4.66	58.17	7.14	55.81	12.33	-1.89	4.78

	d	-0.17	-0.66	-1.11	-1.54

Note. Boys who did not engage in a given sexual activity or did not indicate the sex(es) of the partner(s) were excluded from the analysis. Cohen's *d* was pooled following Rubin's (1987) rule. Similarly to Bailey and Zucker (1995), Hedges's (1982; Formula 4) unbiasing correction was applied.

[a]Larger scores represent higher levels of male-typical behavior and/or lower levels of female-typical behavior.

[b]Above zero: larger scores represent a larger increase in male-typical behavior and/or a larger decrease in female-typical behavior; below zero: smaller scores represent a larger increase in female-typical behavior and/or a larger decrease in male-typical behavior.

[c]Value significantly differs from that in the row immediately below, after Bonferroni correction ($\alpha = .05/4 = .013$, two-tailed). See Table S2 for more information.

Figure 1. Frequency distributions of the levels of gender-typed behavior at preschool years by 2-group sexual orientation at age 15 years. Within-group percentages are presented. Levels of gender-typed behavior were estimated using the Preschool Activity Inventory (PSAI; Golombok & Rust, 1993a, 1993b). Larger PSAI intercepts indicate more male-typical behavior and/or less female-typical behavior.