



# Similarity in transgender and cisgender children's gender development

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**Gender is one of the central categories organizing children's social world. Clear patterns of gender development have been well-documented among cisgender children (i.e., children who identify as a gender that is typically associated with their sex assigned at birth). We present a comprehensive study of gender development (e.g., gender identity and gender expression) in a cohort of 3- to 12-y-old transgender children ( $n = 317$ ) who, in early childhood, are identifying and living as a gender different from their assigned sex. Four primary findings emerged. First, transgender children strongly identify as members of their current gender group and show gender-typed preferences and behaviors that are strongly associated with their current gender, not the gender typically associated with their sex assigned at birth. Second, transgender children's gender identity (i.e., the gender they feel they are) and gender-typed preferences generally did not differ from 2 comparison groups: cisgender siblings ( $n = 189$ ) and cisgender controls ( $n = 316$ ). Third, transgender and cisgender children's patterns of gender development showed coherence across measures. Finally, we observed minimal or no differences in gender identity or preferences as a function of how long transgender children had lived as their current gender. Our findings suggest that early sex assignment and parental rearing based on that sex assignment do not always define how a child identifies or expresses gender later.**

gender development | gender identity | transgender children

Although identities similar to the Western concept of “transgender” have likely existed for centuries in locations across the globe (1–5), for what is likely the first time in Western cultures, thousands of young transgender children are living as a gender that differs from their sex assignment at birth. Unlike past generations of Western transgender individuals, who primarily socially transitioned to live in line with their asserted gender identity in late adolescence or adulthood (6), these children are socially transitioning—changing pronouns from those associated with their sex assigned at birth to binary pronouns associated with a different gender (often accompanied by changes in first names, clothing, and hairstyles)—in the preschool and primary school years (7–9). Unlike future generations of transgender children, these children are often the first in their neighborhoods, schools, and religious communities to socially transition, thereby facing challenges and breaking new ground as they assert their identities on sports teams, at sleep-away camps, and in legal battles for bathroom access, passports, and birth certificates. These young transgender children are different from their cisgender peers in their unique gender socialization experience, having lived part of their childhoods treated as members of one gender (before transitioning) and part of their childhoods treated as members of another gender (after transitioning). Such a unique gender trajectory and socialization experience raises several important questions about gender development (e.g., identity, self-perceptions, attitudes, behaviors) that could not be answered without this cohort of transgender children. In this paper, we examine the extent to which young transgender children's (3–12 y)

sense of their gender identities and their expressions of that identity may differ (or not) from gender identities and expressions of their cisgender peers, and whether the time that a transgender child has spent living and being treated by others as their current gender predicts their gender development.

## Early Gender Development

Previous research on gender has primarily focused on cisgender children—children whose gender identities align with their sex assignment at birth. By their third birthdays, nearly all cisgender children label their gender according to their assigned sex (10–13), and by ages 3–5 y, most children believe that their gender will remain the same in adulthood (14–16). Throughout the preschool and elementary school years, children typically view themselves as highly similar to others of the same gender, and as different from members of another gender (17–19). Cisgender children often show preferences and behaviors that are highly stereotypical of their gender. For example, they show strong preferences for same-gender playmates by age 3 (20–27), preferences for gender-typed toys throughout early and middle childhood, and gender-typed clothing preferences (28).

Most theories of gender development explain these patterns through a combination of influences of biological factors (e.g., assigned sex, prenatal hormone exposure; ref. 29), children's gender cognitions (e.g., self-socialization; refs. 30 and 31), and the cultural and interpersonal socialization they experience (e.g.,

## Significance

Questions of nature and nurture have dominated efforts to understand human gender development. Today's transgender children provide a unique window into gender development: They have been treated as 2 different genders (1 gender before transition and 1 gender after their social transition) and are the first sizable group of children living as a gender that differs from their assigned sex. As such, their experiences enable insight into gender development that is otherwise not possible. The current study provides the largest report to date of the experiences of these early-transitioning children's gender development.

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direct parental and teacher socialization involving rewarding and punishing particular behaviors associated with the child's assigned sex and indirect exposure to social stereotypes and norms about gender more broadly; ref. 32), although theories differ in their emphases of the relative contributions of these forces. Crucially, for the cisgender children who participated in the research cited above, sex assigned at birth, gender identity, and socialization are all typically aligned. Therefore, these various factors likely work to encourage and reinforce stereotypical behaviors, making it difficult to isolate or rule out the impact of different forces.

To illustrate, due to biological factors, a prototypical girl has XX sex chromosomes and feminized genitalia. Because of these attributes, she is labeled as a girl at birth, and is treated by people around her as a girl. She likely will develop an internal sense of being a girl (i.e., gender identity). She may engage in cognitive self-socializing in which she will attend to and emulate social norms related to being a girl, thereby increasing the likelihood that she will engage in behaviors stereotyped "for girls," and to develop preferences for gender-stereotypic activities and expression (i.e., appearance), while also experiencing direct positive or vicarious reinforcement from socialization agents (e.g., parents, peers, media) for engaging in those behaviors. Therefore, by the time she is a young child, it becomes difficult to disentangle the role each of these factors plays in her current gender identity as a girl and her expression of gender via preferences for girl-typed clothing and toys.

In contrast, studying transgender children (as well as other gender-diverse samples, such as intersex individuals, or children with less-common socialization such as children raised without a gender; ref. 33) can help us begin to separate some of these contributors to gender development. For example, a transgender girl may have male external genitalia and be assigned male at birth, may be assumed to identify as a boy, and may be treated by others as a boy, but may nonetheless internally feel like a girl and self-socialize accordingly (e.g., seeking out information about what girls like and how they look). If such a child then favors feminine-typed toys and clothing, these preferences are unlikely due to being assumed a boy at birth or due to direct socialization as an (assumed) boy. Instead, the child's internal sense of identity (e.g., identifying as a girl), paired with broad gender socialization regarding how boys and girls typically act, could better explain the child's gender preferences and expression. In this way, examining the gender development of transgender children can help us to disentangle these different forces and their role in governing children's gender development.

### Gender Development in Transgender vs. Cisgender Children

Historically, development among children who showed persistent and strong cross-gender identification and preferences were often studied as a marker of problematic development that needed to be fixed (34–37), being considered a sign of developmental delay (38), or a sign of inherent psychopathology (34). More recently, however, some researchers, clinicians, and parents are viewing children's cross-gender identification and behaviors as part of a spectrum of normal gender variation rather than a clinical concern (7–9).

In the current research, we are answering the question of whether transgender children's gender development resembles that of cisgender children by comparing these groups on standard measures of gender development. Although this research is exploratory, there are a few possible findings we might observe. Previous research on gender and ethnic identity suggests that a person whose identity is questioned or denied may show stronger association with and assertion of that identity and associated behaviors (39, 40). By similar logic, transgender children could feel threat (e.g., because of that treatment and/or because they have bodies more often associated with another gender identity) and respond by showing stronger identification with their current gender and more extreme gender-typed preferences compared

to cisgender children. Alternatively, transgender children could show weaker association with their current gender than their cisgender peers. Given the hypothesized role of early socialization on children's gender development (41–43), and insofar as transgender children were initially viewed as and socialized as members of a different gender than they currently live as (i.e., were rewarded and punished for acting in accordance with that other gender)\*, they might show weaker association with their current gender (i.e., more association with the other binary gender), compared to cisgender children who have always been treated and socialized as their current gender.

Although some research has examined gender development in children whose sex is neither clearly male nor female (e.g., intersex children; refs. 44 and 45), and in children who show some cross-gender preferences and behaviors (e.g., tomboys; refs. 46–48), to date, only a few studies have examined gender development in socially transitioned transgender children (14, 49–52). Using smaller samples, these early studies have found that transgender children differ significantly from cisgender children of the same assigned sex in terms of their gender development but have not found significant differences between transgender and cisgender children of the same gender. One concern with small studies, however, is that statistical power is low, making null results especially easy to obtain; even a medium or large difference may be obscured by the lack of statistical power (53, 54). In contrast, the present work examines the largest sample of transgender children to date—more than 300 transgender children aged 3–12—to ask 4 research questions.

Our first 2 questions aim to extend findings from prior preliminary research with this much larger sample. First, what does transgender children's gender development look like? If findings from the preliminary studies with transgender children (14, 49–52) are generalizable to a larger sample, transgender children in this study might show clear identification and gender-typing aligned with their current gender, rather than the gender associated with their sex assigned at birth. Assuming this is the case (as in past work), our second question addresses how transgender children's gender development compares to the gender development of their cisgender peers. Again, if past research is replicated with the current larger sample, transgender children in this study might not differ from cisgender children. Such a finding would strengthen interpretation of previous null findings due to larger sample size and even more importantly, would be theoretically significant in suggesting a particularly strong impact of children's self-socialization and/or (unknown) biological factors on gender expression.

The large sample size of the current study allows us to also address previously unanswered questions. Central to these questions is whether transgender children show coherence across measures in their gender identity and expression. Some theories of gender development have argued for the importance of self-socialization of gender: that once children identify with a gender, they are motivated to behave consistently with that identity, and as a result, gender-typed behaviors and preferences tend to become stronger (13, 30, 31, 55, 56). These theories further argue that self-socialization leads to coherence between identity, preferences, and behavior (17, 57–60), meaning that children show preferences and behaviors that are stereotypically associated with the gender they identify themselves as. If there is coherence in measures of identity, preference, and behavior in transgender children, then this reinforces the idea that self-socialization is an important piece of the

\*We tested this assumption by coding early childhood (e.g., first day home after birth, first Halloween) photos of a subset of transgender participants, prior to socially transitioning. Our analyses of these photos showed that transgender children were initially reared in line with their sex assigned at birth, not the gender they are living as today. The full description of these analyses can be found in [SI Appendix](#).

puzzle of gender development. If, however, the relations between identity, preference, and behavior are not cohesive in transgender children, this would suggest different factors (e.g., hormones, parental socialization) impact different domains of gender development and so empirical work will need to focus on explaining each distinct relation (for example, between identity and clothing preferences). Thus, our third research question addresses the coherence between children's responses to standard measures of gender development: Do transgender and cisgender children show similar or different relations among (or coherence in) aspects of gender development?

Finally, we aimed to test a fourth research question: Is the extremity of a transgender child's gender identity and expression related to the amount of time in which the child has been treated as a member of that gender group? Recent research has found that transgender children tested before socially transitioning do not differ in the degree to which they identify and/or express gender preferences when compared to transgender children tested after socially transitioning (52), suggesting that the transition itself may not be changing gender identity and expression. With the current work, we build on this finding by assessing the extent to which time spent living and being treated as their current gender (and not the gender they were assigned at birth) predicts gender development among transgender children. For cisgender children, age and the time during which they have been treated as a certain gender are perfectly correlated, making it difficult to disentangle the question of how timing of socialization relates to development. Transgender children are unique in helping us better understand the role of socialization on gender development, above and beyond age-related development.

## Results

We registered our research questions, measures, exclusion criteria, scoring, and analyses prior to conducting analyses on the full data (<https://osf.io/q2kuw/>; also see the *SI Appendix*)<sup>†</sup>, although data had already been collected (61) and preliminary reports with smaller numbers of participants had been examined (addressing research questions 1 and 2) and, therefore, the registration is not a preregistration nor data-independent.

### What Does Transgender Children's Gender Development Look Like?

On all measures, transgender children showed robust identification and preferences stereotypically associated with their current gender, that differed from chance or gender-neutral responding (all  $P < 0.001$ ; see Table 1 for descriptive statistics, see *SI Appendix* for further information). This meant, for example, transgender boys (assigned females), on average, identified as boys, favored stereotypically masculine toys and clothes, and preferred to be friends with boys.

### How Does Transgender Children's Gender Development Compare to Their Cisgender Peers' Development?

We found few differences between transgender and cisgender participants (see Table 1 for descriptive statistics relevant to each measure; see *SI Appendix*, Figs. S2 and S3 for more details including equivalence tests). On the explicit gender identity measure, which asked participants if they were a boy, a girl, or something else, transgender participants, cisgender controls, and cisgender siblings were all more likely to respond with their current gender (transgender: 84%; cisgender controls: 83%; cisgender siblings: 87%) than with the other gender, or as "something else"; these percentages did not statistically differ by participant group,  $P = 0.782$ ,  $V = 0.03$ . Participant groups also did not differ in terms of their predicted future gender identity,  $P = 0.514$ ,  $V = 0.04$ , or in their perceptions of how similar

they were to members of their own gender,  $F(2,684) = 1.52$ ,  $P = 0.220$ ,  $\eta_p^2 < 0.01$ , or members of the other gender,  $F(2,683) = 0.237$ ,  $P = 0.789$ ,  $\eta_p^2 < 0.01$ . The 3 groups did not differ in the extremity of their gender-typed toy preferences,  $F(2,706) = 0.003$ ,  $P = 0.997$ ,  $\eta_p^2 < 0.01$ , or the strength of their preferences for same-gender peers,  $F(2,743) = 0.11$ ,  $P = 0.899$ ,  $\eta_p^2 < 0.01$ . Further, as can be seen in Fig. 1, participants across groups not only showed similarity in their mean responses, but also in terms of within-group variability; for example, within both transgender and cisgender groups, while some girls showed strongly feminine responses, others showed much less feminine responses.

Although the 3 groups were similar on most measures, we also observed a few differences. The groups differed on implicit gender identity (measured using the Gender Identity Implicit Association Test, which assesses the relative speed of associating oneself with the categories "boys" vs. "girls"),  $F(2,547) = 4.74$ ,  $P = 0.009$ ,  $\eta_p^2 = 0.02$ , and post hoc Tukey comparisons showed that while all groups associated themselves with their current gender, transgender children did so to a lesser extent than cisgender controls ( $P = 0.008$ ,  $d = 0.28$ ,  $d$  values refer to difference between groups), and did not differ from siblings ( $P = 0.056$ ,  $d = 0.27$ ). The latter 2 groups did not differ from each other ( $P = 0.982$ ,  $d = 0.02$ ). In contrast, for stated clothing preferences, transgender participants showed stronger gender-typed clothing preferences than controls ( $P = 0.001$ ,  $d = 0.29$ ) and siblings ( $P < 0.001$ ,  $d = 0.35$ ); the latter 2 groups did not differ from each other ( $P = 0.784$ ,  $d = 0.06$ ); overall omnibus:  $F(2,706) = 9.82$ ,  $P < 0.001$ ,  $\eta_p^2 = 0.03$ , comparisons are post hoc Tukey tests. Further, participants differed in terms of how stereotypically gender-typed their outfit was rated at the time of appointment,  $F(2,760) = 3.44$ ,  $P = 0.033$ ,  $\eta_p^2 = 0.01$ ; however, post hoc Tukey comparisons showed no significant differences between groups ( $P \geq 0.101$ ). Importantly, in the rare case where differences were observed, they tended to be small differences.

### Do Transgender and Cisgender Children Show Similar Coherence in Gender Development?

Our diverse battery of gender measures and large sample allowed us to answer our third research question. In all groups, there was coherence among measures of gender development (see *SI Appendix*, Table S10 for correlations for transgender participants and cisgender controls). The magnitude of these associations was similar across groups<sup>‡</sup>. This means that, for example, children who showed more stereotypical toy preferences also tended to show stronger gender identification and stereotypical clothing preferences.

### Is the Extremity of a Transgender Child's Gender Identity and Expression Related to the Amount of Time in Which the Child Has Been Treated as Their Current Gender?

We assessed whether the amount of time that has passed since a transgender child socially transitioned is associated with the strength of their identification and gender-typed preferences. That is, is it the case that the longer a transgender child has presented as their current gender, the more extreme their identification and preferences related to the current gender? Because we found that participant age was correlated with the amount of time ( $M$  time since transition = 1.14 y,  $SD = 1.13$  y) that had passed since participants' transition,  $r(317) = 0.29$ ,  $P < 0.001$ , we controlled for current age in a series of partial correlations between time since transition and each of the measures described above. After controlling for age, we found that longer time since transition predicted less stereotyped

<sup>†</sup>Whether correlations were small-to-moderate or strong (*SI Appendix*) depended on how items were scored, such that measures were more highly correlated when coded by gender (lower scores indicated masculine responses and higher scores indicated feminine responses) than when coded as a function of a participant's current gender (lower scores indicated more "other gender" responding and higher scores indicated more "own gender" responding).

<sup>‡</sup>Due to word limits, in this report we include only part of the registered analyses and relevant findings. For the full set of analyses, please see *SI Appendix*.

**Table 1. Descriptive statistics\* of participants' scores for each measure**

Task	Control	Transgender	Sibling
Toy preferences (0–100)	68.42 (20.18)	67.64 (21.63)	70.92 (19.94)
Clothing preferences (0–100)	82.74 (17.67)	87.97 (15.43)	81.63 (18.36)
Peer preferences (0–100)	80.88 (21.67)	79.92 (22.39)	78.34 (24.39)
Similarity to own gender (1 to 5)	4.11 (0.75)	4.20 (0.84)	4.14 (0.91)
Similarity to other gender (1 to 5)	2.12 (0.81)	2.08 (0.88)	2.01 (0.88)
Implicit gender identity (~ -2 to ~ +2) <sup>†</sup>	.39 (.47)	.26 (.45)	.38 (.43)
Current gender identity, %	83	84	87
Future gender identity, %	79	80	85
Outfit at appointment (1–5)	4.10 (0.55)	4.17 (0.55)	4.07 (0.55)

Higher scores on all measures indicate greater alignment with current gender identity.  
 \*Means (SDs) reported for all measures, except the current and future gender identity measures, which report the percentage of participants who responded with their current gender.  
<sup>†</sup>Technically, implicit gender identity scores could range above or below  $\pm 2$ ; however, in reality they seldom do.

clothing preferences,  $r(277) = -0.12, P = 0.04$ . We observed no other significant associations between time since transition and any of the measures (for all correlations,  $-0.12 < r < 0.06$  and  $P > 0.100$ ), indicating no evidence that children who transitioned longer ago showed stronger or weaker identities or preferences than children who transitioned more recently (SI Appendix, Table S9).

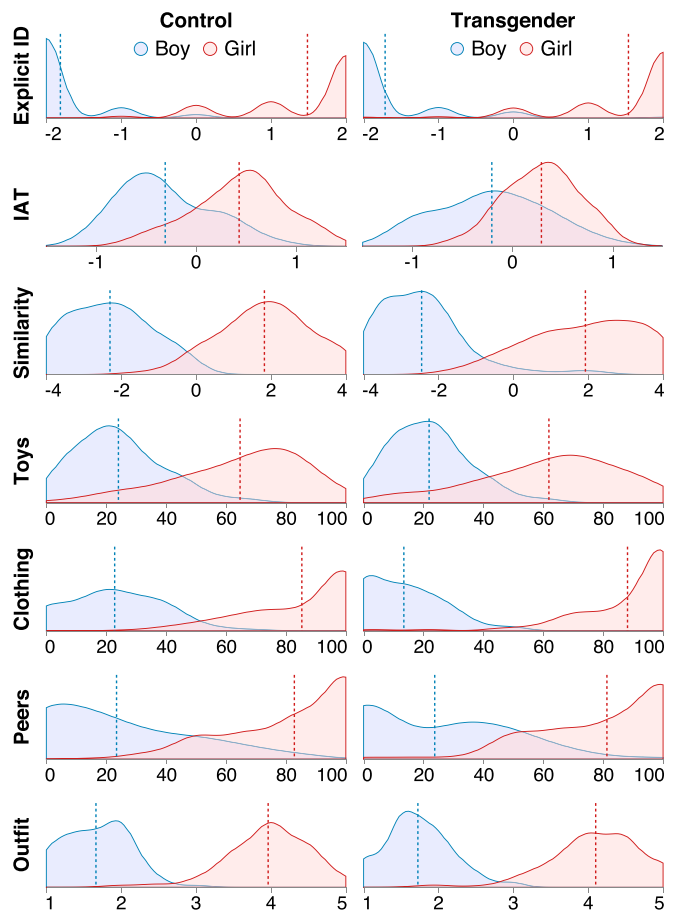
**Discussion**

Transgender children showed a clear pattern of gender development associated with their current gender and not their sex assigned at birth. This pattern was consistent across several measures of gender identity and multiple, distinct measures of gender typing. As predicted by self-socialization perspectives, children showed strong coherence among the identity, preference, and behavioral measures, irrespective of whether they are transgender or cisgender, indicating that both within and across groups, children showed individual differences consistent across facets of their gender development. This coherence suggests a powerful role of individuals' views of themselves and of self-socialization processes on the development of gender typing. The similarity between the transgender group and the cisgender comparison groups was apparent not only in the means but in the distributions, with all groups displaying variability in responses. For example, while on average girls in all groups showed feminine responses, all groups included some girls who showed especially feminine responses and some girls who showed more masculine responses.

Observing few significant differences between groups was notable because the transgender children in this sample spent years being treated as a member of a different gender group than they currently live as, while the cisgender children have always been thought of and treated as members of their current gender group. In fact, even among transgender children, findings did not vary by whether they had just recently transitioned or have been living as their current gender for several years (except for clothing preferences, which was a small effect). This finding further aligns with a recent discovery that transgender children's gender development before socially transitioning did not significantly differ from that of a group of age-matched transgender children tested after socially transitioning (52). Together, these 2 studies suggest the possibility that children in this early-identifying transgender cohort may not show major changes in identification, or in their gender-typed preferences, during the early years, including the years immediately preceding and following transition. Of course, this study is cross-sectional and captures a specific moment in participants' gender development and our broader culture; these findings do not speak to children's future identities or preferences.

These findings have implications that may be useful to consider outside of this cohort of children. Our results demonstrated that transgender children's gender development does not appear to show lingering impact of early sex-assignment or sex-specific

socialization. That is, a 10-y-old transgender girl who was labeled a boy at birth and raised for 9 y as a boy, a 10-y-old transgender girl who was labeled a boy at birth and raised for 5 y as a boy, and a 10-y-old cisgender girl (sibling or control) who was labeled a girl at birth and was raised for 10 y as a girl did not significantly differ in their identification and preferences on the assessed measures. These findings therefore provide preliminary evidence that neither sex



**Fig. 1.** Density plots depicting distributions of girls' and boys' responses on each child measure across the 3 participant groups. Higher scores on the x axis indicate greater identification/association with girls; lower scores on the x axis indicate greater identification/association with boys. Scores for boys on these graphs are reverse coded from those in Table 1. Vertical dotted lines in graphs represent means.

assignment at birth nor direct or indirect sex-specific socialization and expectations (e.g., rewarding masculine things and punishing feminine ones for assigned males) in alignment with early assignment necessarily define how a child later identifies or expresses their gender.

Further, the lack of differences between siblings and controls, observed across measures, suggests that there likely is not a unique gender socialization experience in the homes of transgender children that is changing gender development.

Our findings do not imply that gender socialization is unimportant in early development. To the contrary, early development appears to be the time when, for example, children learn which toys or clothing or activities are stereotyped as masculine or feminine in their culture (62); the children in our study seem to have learned this information by ages 3 and 4, as even our youngest transgender participants showed clearly gendered preferences. Therefore, the transgender children in our sample are showing signs of broader knowledge about gender likely gained through living in their society; they just do not appear to show an impact of early direct socialization geared toward the gender they were assumed to be at birth, at least on the measures assessed here. Instead, in these cases, it appears that transgender children's motivation to self-socialize (31) is likely occurring, and the focus is on learning about characteristics of the other gender rather than learning about characteristics of the gender assigned to them at birth. It is possible that there are children for whom early direct socialization is more influential in shaping their gender identities, and future work might help uncover factors that lead to such developmental trajectories.

One interesting note for future work that came out of these findings is the importance and implications of how we define participant groups. In the current work, we constructed our transgender and cisgender participant groups by using the alignment of one's pronouns and one's assigned sex. However, when we asked children how they identify, a few transgender and cisgender children identified as something other than the gender aligning with their current pronouns. This finding suggests that perhaps these experimenter-created groups, based on pronouns, are somewhat arbitrary. Had we used children's self-categorizations of gender to divide our groups, for example, into boys, girls, and people who prefer a different term, these categorizations would likely have resulted in groups that cross our boundaries of cisgender and transgender. How this approach might impact findings is unknown and has implications for an ongoing discussion on how gender identity should be assessed in research (63).

The present work provides a foundation for additional questions to be addressed in future research on the transgender experience in children. For example, our transgender participants' families affirmed their child's gender identity (as evidenced by allowing their child's early social transition), which was a necessary condition as the current study. Future work is needed to provide insight into the transition process (e.g., who transitions, what factors enable successful transitions), how transitioning influences gender development (although see ref. 52), and the role support and affirmation may play in gender identification and expression.

A second future question concerns how these findings would or would not generalize to samples with different demographic characteristics (i.e., samples with a different range of household income, parental political ideology, race, and level of education; see *SI Appendix*). The present study included comparison groups with similar backgrounds to our transgender sample, which allowed greater confidence that differences in demographics could not explain differences between groups, but future work would benefit from asking whether groups with other characteristics (e.g., in other countries, with families from lower socioeconomic backgrounds) differ from the groups presented here and, if so, consider the reasons that might explain the differences (e.g., differences in access to supportive schools). Our initial data on this issue suggest that demographic characteristics

are not associated with the aspects of gender development assessed here (*SI Appendix*), but future studies with larger ranges of demographic characteristics might better answer these questions.

As highlighted early in the paper, the current study is unique in that it captures gender development in a newly emerging group of transgender children, just as this group of young people are becoming more visible. It is impossible to predict how transitioning at an early age or at this specific historic time may impact later features of children's development, or how development might be impacted if the rates of social transition continue to shift across time such that these children's experiences become more common. At the same time, these children are all living in what is increasingly called a WEIRD (Western, Educated, Industrialized, Rich, Democratic; ref. 64) culture. There are many other cultures that recognize groups with diverse gender identities (1–5); whether the observed patterns would be seen in “transgender” children in these other cultures is, as yet, unknown.

These findings illustrate that children develop a sense of identity at an early age, that this identity is not necessarily determined by sex assigned at birth, and that children may hold on to this identity even when it conflicts with others' expectations. Why children develop such strong feelings of identity and how identity is maintained or changed when in conflict with other socialization forces are seldom addressed in theories of gender development. Our findings also demonstrate that once a child is living in line with an identity different from the one they were assumed to have at birth and were initially socialized to have, they are likely to show the same patterns of gender development as a child who develops a gender aligning with their assigned sex and socialization. Although questions remain about whether young children's identities and preferences will remain consistent over situations and stable over time, these data suggest the power of one's own internal sense of identity (however formed initially) and the consequences of self-socialization on how one thinks about and expresses one's gender.

## Materials and Methods

We collected data from 317 transgender children (208 transgender girls;  $M_{\text{age}} = 96.82$  mo,  $SD = 28.37$ ; 68% White; see *SI Appendix, Fig. S1* for a map of where transgender participants have been recruited; see *SI Appendix* for full demographics of all participants)<sup>5</sup>.

We recruited 2 comparison groups. The first was the Sibling Group. When possible, we recruited the closest in age cisgender sibling ( $n = 189$ ; 82 girls;  $M_{\text{age}} = 96.72$ ,  $SD = 29.72$ ; 68% White) of each transgender participant who was also 3–12 y of age. We also recruited a Control Group of unrelated cisgender participants to match to each transgender child by gender and age ( $n = 316$ ; 207 girls;  $M_{\text{age}} = 97.23$ ,  $SD = 28.27$ ; 70% White). Control participants were recruited from a university database, from 1 major metropolitan area in the Pacific Northwest.

Participants received a battery of tasks assessing multiple indicators of gender development, including explicit gender identity, implicit gender identity (52), perceived similarity to their own and “opposite” gender (18), toy, peer, clothing preferences, and gender-typed behavior (outfit at appointment). Subsets of children in this study also completed other tasks (for more on those measures and why these were kept, see *SI Appendix*). All 3 groups received the same measures. Parents filled out a questionnaire packet containing questions about demographics, and their participating children's gender identity and gender typing (see *SI Appendix* for more details). Children participated only if they provided oral (ages 3–8 y) or written (ages 9 and up) assent, and their parents provided written consent. The study and materials were approved by the University of Washington Institutional Review Board (protocol no. 44772).

**Data Availability.** The registration, data, and analysis script for the results presented in this work can be found online at <https://osf.io/q2kuw/> (doi: 10.17605/OSF.IO/Q2KUW).

<sup>5</sup>Although there are some children who use nonbinary pronouns, (e.g., “they,” “ze”) and consider themselves “transgender,” the present work focused on children who had socially transitioned, and exclusively used binary “he” or “she” pronouns that were not associated with their sex assigned at birth; a criterion determined before the study began. Please see <https://osf.io/duy7b/> for our laboratory's standards for inclusion of participants in papers.

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1. R. Astuti, "It's a boy! It's a girl! Reflections on sex and gender in Madagascar and beyond" in *Bodies and Persons: Comparative Perspectives from Africa and Melanesia*, M. Lambek, A. Strathern, Eds. (Cambridge University Press, Cambridge, UK, 1998).
2. E. Blackwood, Sexuality and gender in Native American tribes: The case of cross-gender females. *Signs J. Women Culture Soc.* **10**, 27–42 (1984).
3. C. Callender et al., The North American berdache. *Curr. Anthropol.* **24**, 443–470 (1983).
4. J. M. Mageo, Male transvestism and cultural change in Samoa. *Am. Ethnol.* **19**, 443–459 (1992).
5. P. L. Vasey, N. H. Bartlett, What can the Samoan "Fa'afafine" teach us about the Western concept of gender identity disorder in childhood? *Perspect. Biol. Med.* **50**, 481–490 (2007).
6. A. H. Devor, Witnessing and mirroring: A fourteen stage model of transsexual identity formation. *J. Gay Lesbian Psychother.* **8**, 41–67 (2004).
7. D. B. Hill, E. Menvielle, K. M. Sica, A. Johnson, An affirmative intervention for families with gender variant children: Parental ratings of child mental health and gender. *J. Sex Marital Ther.* **36**, 6–23 (2010).
8. M. A. Hidalgo et al., The gender affirmative model: What we know and what we aim to learn. *Hum. Development* **56**, 285–290 (2013).
9. J. Malpas, Between pink and blue: A multi-dimensional family approach to gender nonconforming children and their families. *Fam. Process* **50**, 453–470 (2011).
10. A. Campbell, L. Shirley, L. Caygill, Sex-typed preferences in three domains: Do two-year-olds need cognitive variables? *Br. J. Psychol.* **93**, 203–217 (2002).
11. B. I. Fagot, M. D. Leinbach, R. Hagan, Gender labeling and the adoption of sex-typed behaviors. *Dev. Psychol.* **22**, 440–443 (1986).
12. D. N. Ruble, C. L. Martin, "Gender development" in *Handbook of Child Psychology: Social, Emotional, and Personality Development*, W. Damon, N. Eisenberg, Eds. (Wiley, 1998), pp. 933–1016.
13. K. M. Zosuls et al., The acquisition of gender labels in infancy: Implications for gender-typed play. *Dev. Psychol.* **45**, 688–701 (2009).
14. A. A. Fast, K. R. Olson, Gender development in transgender preschool children. *Child Dev.* **89**, 620–637 (2018).
15. D. N. Ruble et al., The role of gender constancy in early gender development. *Child Dev.* **78**, 1121–1136 (2007).
16. R. G. Slaby, K. S. Frey, Development of gender constancy and selective attention to same-sex models. *Child Dev.* **46**, 849–856 (1975).
17. S. K. Egan, D. G. Perry, Gender identity: A multidimensional analysis with implications for psychosocial adjustment. *Dev. Psychol.* **37**, 451–463 (2001).
18. C. L. Martin, N. C. Andrews, D. E. England, K. Zosuls, D. N. Ruble, A dual identity approach for conceptualizing and measuring children's gender identity. *Child Dev.* **88**, 167–182 (2017).
19. J. L. Yunger, P. R. Carver, D. G. Perry, Does gender identity influence children's psychological well-being? *Dev. Psychol.* **40**, 572–582 (2004).
20. M. L. Halim, D. N. Ruble, C. Tamis-LeMonda, P. E. Shrout, Rigidity in gender-typed behaviors in early childhood: A longitudinal study of ethnic minority children. *Child Dev.* **84**, 1269–1284 (2013).
21. P. La Freniere, F. F. Strayer, R. Gauthier, The emergence of same-sex affiliative preferences among preschool peers: A developmental/ethological perspective. *Child Dev.* **55**, 1958–1965 (1984).
22. E. E. Maccoby, *The Two Sexes: Growing up Apart, Coming Together* (Belknap/Harvard University Press, Cambridge, MA, 1998).
23. E. E. Maccoby, C. N. Jacklin, Gender segregation in childhood. *Adv. Child Dev. Behav.* **20**, 239–287 (1987).
24. C. L. Martin, R. A. Fabes, The stability and consequences of young children's same-sex peer interactions. *Dev. Psychol.* **37**, 431–446 (2001).
25. C. L. Martin, R. A. Fabes, S. M. Evans, H. Wyman, Social cognition on the playground: Children's beliefs about playing with girls versus boys and their relations to sex segregated play. *J. Soc. Pers. Relat.* **16**, 751–771 (1999).
26. S. M. McHale, J. Y. Kim, S. Whiteman, A. C. Crouter, Links between sex-typed time use in middle childhood and gender development in early adolescence. *Dev. Psychol.* **40**, 868–881 (2004).
27. L. A. Serbin, K. K. Powlishta, J. Gulko, C. L. Martin, M. E. Lockheed, The development of sex typing in middle childhood. *Monogr. Soc. Res. Child Dev.* **58**, 1–99 (1993).
28. M. L. Halim et al., Pink frilly dresses and the avoidance of all things "girly": children's appearance rigidity and cognitive theories of gender development. *Dev. Psychol.* **50**, 1091–1101 (2014).
29. V. Jadva, M. Hines, S. Golombok, Infants' preferences for toys, colors, and shapes: Sex differences and similarities. *Arch. Sex. Behav.* **39**, 1261–1273 (2010).
30. L. Kohlberg, "A cognitive-developmental analysis of children's sex-role concepts and attitudes" in *The Development of Sex Differences*, E. E. Maccoby, Ed. (Stanford University Press, Stanford, CA, 1966), pp. 82–173.
31. C. L. Martin, D. N. Ruble, J. Szkrzybalo, Cognitive theories of early gender development. *Psychol. Bull.* **128**, 903–933 (2002).
32. W. Mischel, "Sex-typing and socialization" in *Carmichael's Manual of Child Psychology*, P. H. Mussen, Ed. (Wiley, 1970), vol. 2, pp. 3–72.
33. Y. Dunham, K. R. Olson, Beyond discrete categories: Studying multiracial, intersex, and transgender children will strengthen basic developmental science. *J. Cogn. Dev.* **17**, 642–665 (2016).
34. S. Coates, E. S. Person, Extreme boyhood femininity: Isolated behavior or pervasive disorder? *J. Am. Acad. Child Psychiatry* **24**, 702–709 (1985).
35. G. A. Rekers, O. I. Lovaas, Behavioral treatment of deviant sex-role behaviors in a male child. *J. Appl. Behav. Anal.* **7**, 173–190 (1974).
36. G. A. Rekers, O. I. Lovaas, B. Low, The behavioral treatment of a "transsexual" pre-adolescent boy. *J. Abnorm. Child Psychol.* **2**, 99–116 (1974).
37. P. McHugh, Transgender surgery isn't the solution. *Wall Street Journal*. <https://www.wsj.com/articles/paul-mchugh-transgender-surgery-isnt-the-solution-1402615120>. Accessed 13 May 2014.
38. K. J. Zucker et al., Gender constancy judgments in children with gender identity disorder: Evidence for a developmental lag. *Arch. Sex. Behav.* **28**, 475–502 (1999).
39. M. Barreto, R. Spears, N. Ellemers, K. Shahinper, Who wants to know? The effect of audience on identity expression among minority group members. *Br. J. Soc. Psychol.* **42**, 299–318 (2003).
40. S. Cheryan, J. Cameron, Z. Katagiri, B. Monin, Manning up: Threatened men compensate by disavowing feminine preferences and embracing masculine attributes. *Soc. Psychol.* **46**, 218–227 (2015).
41. K. Bussey, A. Bandura, Self-regulatory mechanisms governing gender development. *Child Dev.* **63**, 1236–1250 (1992).
42. K. Bussey, A. Bandura, Social cognitive theory of gender development and differentiation. *Psychol. Rev.* **106**, 676–713 (1999).
43. E. E. Maccoby, Parenting and its effects on children: On reading and misreading behavior genetics. *Annu. Rev. Psychol.* **51**, 1–27 (2000).
44. L. Frisén et al., Gender role behavior, sexuality, and psychosocial adaptation in women with congenital adrenal hyperplasia due to CYP21A2 deficiency. *J. Clin. Endocrinol. Metab.* **94**, 3432–3439 (2009).
45. H. F. L. Meyer-Bahlburg et al., Prenatal androgenization affects gender-related behavior but not gender identity in 5-12-year-old girls with congenital adrenal hyperplasia. *Arch. Sex. Behav.* **33**, 97–104 (2004).
46. C. L. Martin, L. M. Dinella, Congruence between gender stereotypes and activity preference in self-identified tomboys and non-tomboys. *Arch. Sex. Behav.* **41**, 599–610 (2012).
47. J. M. Bailey, K. T. Bechtold, S. A. Berenbaum, Who are tomboys and why should we study them? *Arch. Sex. Behav.* **31**, 333–341 (2002).
48. S. Ahlqvist, M. L. Halim, F. K. Greulich, L. E. Lurye, D. Ruble, The potential benefits and risks of identifying as a tomboy: A social identity perspective. *Self and Identity* **12**, 563–568 (2013).
49. K. R. Olson, A. C. Key, N. R. Eaton, Gender cognition in transgender children. *Psychol. Sci.* **26**, 467–474 (2015).
50. K. R. Olson, E. A. Enright, Do transgender children (gender) stereotype less than their peers and siblings? *Dev. Sci.* **21**, e12606 (2018).
51. J. R. Rae, K. R. Olson, Test-retest reliability and predictive validity of the Implicit Association Test in children. *Dev. Psychol.* **54**, 308–330 (2018).
52. J. R. Rae et al., Predicting early childhood gender transition. *Psychol. Sci.* **30**, 669–681 (2019).
53. J. Cohen, Statistical power analysis. *Curr. Dir. Psychol. Sci.* **1**, 98–101 (1992).
54. J. A. C. Sterne, G. D. Smith, Sifting the evidence—what's wrong with significance tests? *Phys. Ther.* **81**, 1464–1469 (2001).
55. C. L. Martin, C. F. Halverson, A schematic processing model of sex typing and stereotyping in children. *Child Dev.* **52**, 1119–1134 (1981).
56. K. M. Zosuls, D. N. Ruble, C. S. Tamis-LeMonda, Self-socialization of gender in African American, Dominican immigrant, and Mexican immigrant toddlers. *Child Dev.* **85**, 2202–2217 (2014).
57. B. I. Fagot, M. D. Leinbach, The young child's gender schema: Environmental input, internal organization. *Child Dev.* **60**, 663–672 (1989).
58. C. L. Martin, J. K. Little, The relation of gender understanding to children's sex-typed preferences and gender stereotypes. *Child Dev.* **61**, 1427–1439 (1990).
59. M. M. Patterson, Self-perceived gender typicality, gender-typed attributes, and gender stereotype endorsement in elementary-school-aged children. *Sex Roles* **67**, 422–434 (2012).
60. M. Weinraub et al., The development of sex role stereotypes in the third year: Relationships to gender labeling, gender identity, sex-typed toy preference, and family characteristics. *Child Dev.* **55**, 1493–1503 (1984).
61. S. Gülgöz, K. R. Olson, Gender development among transgender and cisgender children. Open Science Framework. <https://osf.io/q2kuw/>. Deposited 31 October 2019.
62. C. Leaper, "Gender and social-cognitive development" in *Handbook of Child Psychology and Developmental Science*, R. M. Lerner, Ed. (Wiley, 2015), pp. 1–48.
63. C. C. Tate, J. N. Ledbetter, C. P. Youssef, A two-question method for assessing gender categories in the social and medical sciences. *J. Sex Res.* **50**, 767–776 (2013).
64. J. Henrich, S. J. Heine, A. Norenzayan, The weirdest people in the world? *Behav. Brain Sci.* **33**, 61–83 (2010).