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Gender Development in Gender Diverse Children

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Abstract

Within “mainstream” developmental science, gender researchers largely study the developmental trajectory of children considered to be “gender-typical”, while research housed primarily in psychiatry and clinical psychology often documents the trajectories of gender diverse children. This article aims to bridge the studies of gender diversity and “mainstream” gender development. First, we review literature on the development of four commonly studied subgroups of gender diverse children – children referred to medical clinics because of their gender identity and expression, transgender children, female children with congenital adrenal hyperplasia, and tomboys – highlighting how these gender trajectories do or do not align with modal developmental patterns. We then describe social, cognitive, and biological determinants of gender in light of their implications for understanding diverse gender development. Finally, we note methodological suggestions for future research, with an eye toward better integrating research on gender diversity into “mainstream” gender development research.

Keywords

gender development; gender identity; gender diversity; transgender; LGBTQ

Gender diverse children are experiencing a period of unprecedented visibility. They are appearing more frequently in media coverage; their rights are being debated in schools, legislatures, and courts of law; and larger numbers of these youth are coming out to their families, friends, and peers. With this increase in visibility, parents, educators, and medical professionals are trying to understand how gender diverse children experience gender. Insights from developmental science have the potential to play a major role in helping the public reach this understanding.

Developmental science has long characterized gender in childhood, but this characterization has not applied to all children. Since the 1950’s, researchers in “mainstream” developmental science have painted a detailed portrait of the experiences of one particular variety of

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child: one who shows the modal - that is, statistically most common - pattern of gender development. For this kind of child, research has shown that their gender largely aligns with their assigned sex. Once their gender identity has emerged within the first three years of life, it is central to their sense of self and exerts profound influence over their social interactions, peer relationships, and activity preferences (Brown, 1956; Halim & Ruble, 2010; Rabban, 1950; Ruble et al., 2006; Maccoby & Jacklin, 1987; Thompson, 1975).

Of course, investigating the modal developmental pattern is critical, and is an approach that is commonly adopted in studying other facets of child development. But this focus on the modal pattern leaves a large swath of children - children we will call “gender diverse” here – out of the discussion. These children include, for example, youth who prefer to play with children of another gender, those who routinely gravitate towards activities that are not stereotypically “for” children of their gender, and those who identify with a different gender than the one associated with their sex at birth. As these youth gain visibility in families, schools, sports teams, and other focal points of social life, it becomes increasingly critical that research reflect how they conceptualize and enact their gender. Furthermore, psychologists aim to answer big theoretical questions about the development of gender: Where do children’s strikingly pervasive preferences for gender-stereotyped clothing, activities and toys come from? How, and to what extent, do people change how they think about their own and others’ genders over time? Should gender be thought of as categorical or continuous across childhood? Such questions are impossible to answer without considering the full variability in gender trajectories that children show.

While developmental psychology has focused mainly on characterizing modal gender development, other lines of work, often in clinical psychology or psychiatry, have focused on describing gender diversity (e.g., Berenbaum & Hines, 1992; Collaer & Hines, 1995; Green, 1987; Green & Money, 1960; Zucker & Bradley, 1995). Nevertheless, even though the research traditions on gender diverse and modal gender development are both broadly concerned with understanding gender development, research teams from these two traditions often recruited participants in different ways (e.g., clinical and medical vs. lab or school-based research); often had different goals (e.g., characterizing or changing gender diverse children’s development vs. describing modal development); often operated in different primary research fields (e.g., pediatrics, psychiatry and clinical psychology vs. social and cognitive development); regularly published in distinct outlets for publication (e.g., work on gender diversity has tended to be published in journals like *Archives of Sexual Behavior* and *Pediatrics*, whereas work on modal gender development has tended to be published in journals like *Developmental Psychology* and *Child Development*); and often discussed their findings at different conferences as part of different professional organizations. As a result, the two subfields have engaged in less crosstalk than might be necessary to develop broader theories and descriptions of the full diversity of gender experience in childhood.

In this review, we have three goals, all in service of underscoring the wide variability in human gender development by bringing the literature on gender diverse development into conversation with the broader literature on modal gender development (important findings of which are summarized in the “Key Findings in Modal Gender Development” sidebar). First, we summarize several research literatures on gender development in gender diverse

children while highlighting when findings about gender diverse children do or do not align with modal gender development. Second, we discuss how findings about gender diverse children bear on the roles of social, cognitive, and biological determinants of gender identity. Third, we comment on how future research might better integrate the experiences of a broad spectrum of youth when designing new empirical studies and theoretical frameworks of gender development.

Scope and structure of reviewed literature.

Our aim was to review the literature on gender development within samples of non-modal youth (focusing primarily on those age 12 and younger) for which there is a well-established set of findings. We excluded groups that were studied in only a few papers. As a result, we focus on four, sometimes overlapping, subgroups of children: gender-referred children, transgender children, assigned female children with congenital adrenal hyperplasia (CAH), and tomboys. Admittedly, the sample sizes in some past work are small (see Table SM1 for sample sizes of each article) and we urge caution when interpreting the results of the smaller studies (Davis-Kean & Ellis, 2019).

While gender-referred youth, transgender children, and tomboys are gender diverse by definition, the inclusion of children with CAH may be less obvious, since some children in this group show modal gender development. However, the findings from this literature suggest that children with XX chromosomes who have CAH show, on average, some aspects of gender diversity (e.g., preferences for stereotypically masculine toys among assigned female children); thus, we opted to include them. Importantly, while all of these groups are themselves diverse and show substantial within-group variability, research on gender diverse children (like research on modal development) has tended to focus on group averages. Therefore, in this review, we typically describe average effects rather than emphasizing within-group variability. We recognize the contradiction inherent in critiquing the field's focus on modal development and then summarizing the most common pattern within each of these non-modal groups. However, because the past literature focused on group averages rather than variance, a broader description is not possible.

Many of the studies we review examine children's gender stereotypical or counter-stereotypical preferences. One critique of this research is that labeling certain toys, peers, play styles, and clothing as "feminine" or "masculine" perpetuates such stereotypes. A related problem is that authors of some of the work reviewed here have, implicitly or explicitly, presented gender stereotypical behavior as better or more appropriate than counter-stereotypical behavior. We reject the notion that showing preferences in line with or against a cultural gender stereotype is desirable or not. However, for concision and ease of understanding, we do occasionally use language implying that some preferences are "masculine" or "feminine", by which we mean "perceived by members of the child's culture as masculine or feminine", rather than implying that an object or preference is inherently gendered.

Research review of gender development in gender diverse children

I. “Gender-referred” children.

Beginning in the 1960’s, a number of psychologists and psychiatrists published qualitative case studies and other articles describing children who were assigned male at birth, asserted a desire to be girls, and showed persistent gender nonconforming behavior (e.g., Green & Money, 1960; Green & Money, 1961; Stoller, 1966; Zuger, 1966). By the 1970’s, researchers began systematic investigations of these youth and, less frequently, studies of assigned female children who showed consistent stereotypical masculine characteristics (e.g., Drummond et al., 2008). This research took place mainly in clinical settings within major university medical centers or psychology clinics that studied and provided treatment to gender nonconforming children (often with the intention of reducing gender nonconforming behaviors and/or increasing gender conforming behaviors). As an example of who participated in this work, Green (1987) recruited children by publicizing a study for boys who showed “frequent dressing in girls’ or women’s clothing, a preference for traditional girls’ activities, and/or statements of wanting to be a girl”. Much of this research compared gender diverse youth—whom we refer to as *gender-referred* in this section, borrowing the term used in several empirical studies in this tradition (e.g., Zucker et al., 1999; Zucker, 2005; Chiu et al., 2006)—to children assumed to show modal gender identity and expression, such as clinical controls, siblings, and children in the community (e.g., Green, 1987; Zucker & Bradley, 1995).

Summary of findings.—Generally, this literature found that gender-referred children preferred toys, dolls, games, and play activities stereotypically associated with the other binary gender more than gender-conforming children did (Rekers & Yates, 1976; Green, 1976; Zucker et al., 1982; Zucker et al., 1985; Doering et al., 1989; Fridell et al., 2006). Gender-referred boys were also noted to engage in less rough-and-tumble play than gender-conforming boys (Green, 1976). Sometimes, gender-referred children as a group showed no preference between masculine and feminine toys and play activities, whereas gender-conforming youth showed strong preferences for toys and activities stereotypically associated with their gender (Zucker et al., 1982; Zucker et al., 1985; Doering et al., 1989). In these cases, preferences for same-gender-typed and other-gender-typed toys and activities showed a bimodal distribution, with relatively few gender-referred children showing equal preference for masculine and feminine toys and play activities.

Several studies also indicated that gender-referred children reported preferences for, or related more to, peers of the other binary gender (e.g., Green, 1976). For example, Fridell et al. (2006) found that both gender-referred boys and girls favored peers of the other binary gender. A related set of studies found that wearing clothing stereotypically associated with the other binary gender was common in gender-referred children, particularly relative to their siblings or other gender-conforming children (Zuger, 1966; Green, 1976; Doering et al., 1989; Zucker et al., 1985).

Differences between gender-referred children and their gender-conforming counterparts have been reported on several other tasks. When asked to draw a person, ostensibly to index the gender experience or representation most salient to the child, gender-referred children

were more likely than gender-conforming children to draw people of the other binary gender (Skillbeck et al., 1975; Zucker et al., 1983; Zucker et al., 1985). Gender-referred boys had more mannerisms perceived by the researchers as feminine (e.g., “less ideal ball-throw”; Bates et al., 1979), preferred colors stereotypically associated with the other binary gender (Chiu et al., 2006), and were less likely to say that their own or someone else’s gender would stay constant across time or situational changes relative to gender-conforming children (Zucker et al., 1999). Overall, this work showed that the gender development of gender-referred children diverged from modal gender development.

Contributions of this literature.—Gender nonconformity has been documented throughout history (Gill-Peterson, 2018), but the above work expanded upon previous descriptions of gender diversity in several ways. First, this line of work was the first to systematically document a pattern of behaviors that were emblematic of gender nonconformity, and moved the study of gender diversity in childhood from a field comprised mainly of qualitative case studies to something more quantitative and systematic. Second, this work served as an existence proof of a cohort of gender diverse children with some consistent characteristics. Longitudinal studies in this tradition also demonstrated that, at least in some cases, gender nonconforming behaviors could be indicative of individual differences that were relatively stable within children across time and predictive of later identities (including sexual orientations and gender identities), even as the same behaviors could sometimes reflect fleeting patterns in other children.

Limitations and critiques of this literature.—A substantial portion of this research has assumed that gender diverse behavior is undesirable, or otherwise so harmful to children’s future acceptance by peers that it should be subject to clinical intervention. Particularly in earlier studies in this tradition, gender diverse individuals were referred to in parlance now considered pejorative. Many of the youth studied in this tradition ended up at these clinics because their parents or other adults had a concern about their gender expression or identity, and parents would often receive instruction from clinicians on how to modify their children’s behaviors so that the child would eventually conform to gender norms and/or avoid eventual LGBTQ identities. The addition of gender identity disorder (GID) into the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) in 1980, and its later rebranding as gender dysphoria (GD) in 2013, was largely based on this research, which was also used to define the “disorder.” Further, efforts to include GID in the DSM-III were largely led by the very researchers doing this work (Zucker & Spitzer, 2005). Considerable controversy continues today about whether any diagnosis based on gender identity or gender nonconformity should be included in the DSM and the extent to which work in this tradition contributed to the ongoing pathologization of gender nonconforming behavior (Davy & Toze, 2018).

II. Transgender children.

A separate line of research has emerged within the past decade that has begun to describe the gender development of transgender children. Had they been born decades or years ago, some of these children may have been taken to the kinds of clinics described in the previous section. However, it is hard to know how transgender youth studied now (and their families)

may or may not differ from those in the previous section (Temple Newhook et al., 2018). For these reasons, we review this literature separately.

In general, the transgender children who participated in the research we review reported knowing from an early age that their gender differed from the one assumed based on their assigned sex. These youth underwent childhood social transitions, changing their name, pronouns, hairstyle, and clothing to match their gender identity. While early childhood social transitions have been recorded at least since 1930 in the U.S. (Gill-Peterson, 2018), the number of youth doing so throughout North America and Europe appears to be increasing in the last decade or two (Steensma & Cohen-Kettenis, 2011; de Graaf & Carmichael, 2019; Chen et al., 2018).

Mirroring work on gender-referred children, researchers studying transgender children have assessed whether their gender development—namely, identity, peer preferences, clothing, play, gender constancy, gender essentialism, and other measures—differs significantly from that of their cisgender peers. However, a key difference is that while researchers studying gender-referred children compared their responses to other children who shared their assigned sex, researchers studying transgender children have more often compared their responses to children who share their gender identity (and not their assigned sex). As a result, research on transgender children tends to focus on similarities rather than differences. Most of the data in this area have come from a single ongoing, longitudinal study of a cohort of transgender youth called the Trans Youth Project (Olson & Gülgöz, 2018), which began tracking the cohort when the children were 3–12 years old (Gülgöz et al., 2019b).

Summary of findings.—Several studies asked transgender and cisgender children to explicitly report their gender and found that both groups tended to identify with the gender they express in their everyday life (Olson et al., 2015; Fast & Olson, 2018; Gülgöz et al., 2019b). One study assessed children’s gender by asking participants to indicate where their gender fell on a spectrum between “feel totally like a boy” and “feel totally like a girl” (Gülgöz et al., in press), while another used three measures of identity: an explicit categorization measure (do children identify as boys, girls, or something else), an explicit measure of relative similarity to boys and girls, and an implicit measure of gender identity (Gülgöz et al., 2019b). On all of the explicit measures, transgender and cisgender youth of the same gender responded similarly, but on the implicit measure, transgender children showed slightly less binary identification (Gülgöz et al., 2019b).

In the domain of preferences, Gülgöz et al. (2019b) found that both transgender and cisgender children tended to favor toys stereotypically associated with their gender at similar rates, and Olson et al. (2015) found that transgender and cisgender children alike preferred novel objects that were endorsed by people of the same gender. The two groups of children also did not differ in their preference for same-gender peers (Gülgöz et al., 2019b), and both preferred wearing clothes that are stereotypically associated with their gender identity (Fast & Olson, 2018), with transgender children showing a slightly stronger preference for gender-typed clothing than cisgender children (Gülgöz et al., 2019b). Importantly, within both transgender and cisgender children, preferences for toys and clothing varied widely

(i.e., some transgender and cisgender girls had masculine toy preferences; Gülgöz et al., 2019b).

Studies of gender stereotyping, essentialism, and constancy have found mixed results. Most studies have found similarities between how transgender children, their cisgender siblings, and unrelated cisgender children think about gender: for example, all three groups have shown similar levels of gender stereotype endorsement (Rubin et al., 2020) and similar levels of gender essentialism (Gülgöz et al., 2019a). When differences between groups have occasionally emerged, they have tended to occur in one direction: transgender youth (and to some extent their siblings) reported slightly less traditional views of gender—they sometimes essentialized and endorsed gender stereotypes less, or saw gender as less constant (e.g., Gülgöz et al., 2021; Olson & Enright, 2018; Fast & Olson, 2018). Finally, researchers found that 3–5-year-old gender diverse children, their siblings, and unrelated cisgender children were similarly likely to attend to, encode, and remember the gender of children in a story (Glazier et al., 2020), suggesting that gender is no more salient to one of these groups than it is to the other.

A final thread in this line of work concerns stability or change in children's gender-related cognition, including gender identity, over time. Approximately 5 years after their initial binary social transition, 94% of this cohort continued to live as binary transgender youth (3.5% lived as nonbinary youth and 2.5% as cisgender youth; Olson et al., in press). When gender identity was assessed as a continuous spectrum ($r = 0.36$, Gülgöz et al., in press), or using the Implicit Association Task (IAT), gender diverse (including 31 transgender, 10 gender nonconforming; $r = 0.56$; Rae & Olson, 2018), researchers observed significant associations over 1–2 year timespans, with medium-to-large effect sizes. Another study found that, across a time gap of 2 ½ years, transgender children, their siblings, and unrelated cisgender children showed similar degrees of consistency in a composite measure of their gender identity and gender-typed preferences (Hässler et al., under review). One additional study found that a composite of gender identity and preference measures predicted which children did versus did not socially transition an average of two years later (Rae et al., 2019).

Contributions of this literature.—This work represents the first large-scale empirical description of gender development in early-identifying transgender youth who have gone on to socially transition, a growing demographic (Steensma & Cohen-Kettenis, 2011; de Graaf & Carmichael, 2019; Chen et al., 2018). It generally shows that gender development in binary transgender and cisgender children is similar, and that gender development within each group varies considerably. Moreover, this work rejects the notion that persistent gender nonconforming behavior is the result of parent socialization, as these youth were almost always initially raised as a gender that aligns with their assigned sex (Gülgöz et al., 2019b); or that transgender children are simply “confused” about their gender (Olson et al., 2015). This work has also sought to use less binary gender measures (e.g., Gülgöz et al., in press), and the research team involved in this work has intentionally included transgender team members throughout the research process.

Limitations and critiques of this literature.—Not all children have the option to socially transition. Those children who have the psychological experience of being

transgender, but who for any reason do not or cannot undergo a social transition, are automatically precluded from the above research because childhood social transition was a prerequisite for inclusion. As a result, some of the findings could be driven by the social and cultural factors (e.g., parental support, knowledge that transitions are possible, etc.) that make it possible for some children to socially transition, rather than being applicable to the larger group of children who would socially transition if they knew it were possible and were free to do so. Additionally, the definition of “transgender” in this work was both binary and determined by pronoun use. If children did not use the other binary pronoun than the one associated with their assigned sex in all contexts, then they were not included in the transgender sample. Current societal conceptions of transgender identity are broader and more flexible than this criterion, including (for example) nonbinary youth. As a result of their exclusion from this work, less is known about these groups. Finally, the reliance of this work on a single cohort, and the reporting of this cohort by a single research team, are limitations.

III. Children with Congenital Adrenal Hyperplasia (CAH).

Research dating back to the 1970’s has described the gender development of children with congenital adrenal hyperplasia (CAH). CAH is a genetic condition that affects the adrenal glands and results in higher-than-normal production of—and therefore exposure to—androgens, beginning in utero (Merke & Bornstein, 2005). CAH varies widely in its clinical presentation and can result in a range of physical characteristics. Its most common form, 21- α hydroxylase deficiency, accounts for approximately 95% of cases, and is estimated to affect 1 in 15,000 people in the U.S. and Europe, though its incidence is higher in some subpopulations (e.g., Yupik Eskimos; Pang et al., 1982). CAH can occur in several subforms, each of which shows a range of clinical presentations. Classical CAH is characterized by an attenuated ability to produce some corticosteroid hormones, leading to high exposure to androgens in utero that can result in ambiguous genitalia in newborns with XX chromosomes. Classical CAH generally falls into two categories: salt wasting, in which corticosteroid hormone dysregulation is severe enough that it leads to loss of essential salts, along with virilization of the genitalia in children with XX chromosomes; and simple virilizing, in which salt wasting does not occur (or occurs minimally), but virilization of the genitalia in children with XX chromosomes does. In non-classical CAH, patients still produce androgens at higher levels than the normative range, but to a small enough extent that physical presentation of CAH in assigned females may not occur until later childhood or adolescence.

While both classical and non-classical CAH can occur in youth who have XX or XY chromosomes, gender researchers have primarily been interested in studying CAH in children with XX chromosomes (who are most often raised as females) because their high rates of early androgen exposure are uncommon in other females. As in the gender-referred and transgender research literatures, gender development researchers have compared assigned female children with CAH to other children (both assigned females and males) without CAH in a variety of domains.

Summary of findings.—Perhaps the most basic question asked about gender development in children with CAH—particularly children who were assigned female—is whether their gender identity differs from children without CAH. One review by Dessens et al. (2005) indicated that, out of 250 adults with CAH who were initially assigned female and were studied in prior literature, 13 (5.2%) experienced gender dysphoria and 4 (1.6%) transitioned to live as men in adulthood, suggesting that (at least by adulthood) assigned females with CAH were more likely to identify as boys or men compared to the general population of assigned female individuals at the time of the study. However, prior literature is mixed on whether gender identity among children who were assigned female with CAH differs from those without CAH. Some studies have, for example, assessed gender identity by asking children a standardized battery of questions that directly probe the children’s gender identities (e.g., “Are you a boy or a girl?”); one of these studies found that assigned female children with CAH identified more as boys (Pasterski et al., 2015) while another did not (Meyer-Bahlburg et al., 2004). Other studies have asked children a less direct set of questions (e.g., “Would you rather be a father or a mother?” or “Do you ever wish you were a boy?”). One of these studies found that, among assigned female children, those with CAH tended to report slightly more masculine gender identities than those without CAH (Berenbaum & Bailey, 2003). A possible reason for the discrepant findings is that the small sample sizes used in this work (see Table SM1), paired with the relative infrequency of gender dysphoria, make it difficult to precisely estimate the frequency with which assigned female children with CAH identify as boys.

The literature on the activity, toy, play, and peer preferences of assigned female children with CAH has been more consistent, finding that they were more likely to prefer stereotypically masculine toys (Hines et al., 2016; Spencer et al., 2021; Servin, et al., 2003; Nordenström et al., 2002; Berenbaum & Hines, 1992; Berenbaum & Snyder, 1995), male or masculine playmates and peers (Spencer et al., 2021; Pasterski et al., 2015; Servin et al., 2003; Nordenström et al., 2002; Pasterski et al., 2011), and stereotypically masculine activities and hobbies (Meyer-Bahlburg et al., 2006; Meyer-Bahlburg et al., 2004; Hall et al., 2004; Berenbaum, 1999; Berenbaum & Snyder, 1995) than assigned female children without CAH. They also showed more aggression (Pasterski et al., 2007; Mathews et al., 2009) and rough-and-tumble play (Pasterski et al., 2011), more “masculine” free drawings (Iijima et al., 2001), and less interest in infant caretaking (Leveroni & Berenbaum, 1998) than assigned female children without CAH. Some literature has suggested that more “severe” forms of CAH are associated with greater masculine-typed behavior (e.g., Hall et al., 2004; Meyer-Bahlburg et al., 2006; Servin et al., 2003). One study showed that assigned female children with CAH were less likely than those without CAH to prefer objects and toys that were modeled by women or labeled as ‘for girls’, suggesting that knowledge that something is gendered, rather than something inherent about the object, may drive part or all of this preference (Hines et al., 2016).

Contributions of this literature.—The above work has generally shown that children who were assigned female with CAH show stronger interest in masculine-stereotyped toys and activities. Evidence on whether childhood gender identity differs in assigned females with and without CAH is mixed, though work with adults suggests an elevated rate of gender

dysphoria among adults with CAH compared to the general population (e.g., Dessens et al., 2005; Meyer-Bahlburg et al., 2006). This research has been some of the most cited and well-documented work showing possible biological influences on gender development. While the mechanism connecting prenatal androgen exposure to specific gendered behaviors (such as preferring stereotypically masculine toys) is not precisely understood, many scholars have used findings from the CAH literature to argue that hormone exposure has an impact on gender development in childhood (others express skepticism of this interpretation, e.g., Fine, 2015). This work also shows that gendered behavior and gender identity are not always aligned, since many girls with CAH show clearly masculine-stereotyped behavior but identify strongly as girls. The variability in behavior, but not necessarily identity, apparent in assigned females with CAH suggests that behavior and identity as constructs are best understood more independently than they have historically been, a point echoed by several scholars who study transgender and gender nonconforming people (e.g., Tate et al., 2015).

Limitations and critiques of this literature.—A substantial challenge in this literature is that many of the findings, particularly those pertaining to gender identity, are mixed, making clear conclusions elusive. This lack of consistency likely occurs at least in part due to small sample sizes (nearly all of the studies reviewed had fewer than 50 assigned female participants with CAH and sometimes as few as 15) and the relative infrequency of gender dysphoria. A further limitation is that the causal mechanism implicating CAH in masculine-typed behavior and preferences among assigned female children is difficult to characterize empirically, since CAH is usually diagnosed perinatally, meaning that a precise measurement of testosterone in the fetal environment is no longer possible when the diagnosis is made. Relatedly, some researchers have argued that individual differences in gender development among assigned female children with CAH are due not to “masculinization” of the brain via prenatal androgen exposure, but rather are determined by factors such as intensive medical interventions and expectations of masculinity (Jordan-Young, 2012).

IV. Tomboys.

Tomboys—girls who possess stereotypically masculine characteristics—have received some attention from developmental psychologists, but surprisingly little considering how visible tomboys are in culture and media in the United States. Published research on tomboys within the last decade is particularly scarce. The exact definition of a tomboy is not consistent in the psychological literature: instead, studies often simply ask parents (e.g., Green et al., 1982) or children (Plumb & Cowan, 1984; Martin & Dinella, 2012) if their child or they themselves identify as tomboys, allowing each parent or child to decide for themselves what that term means. While some studies use a binary categorization (is/is not a tomboy, Bailey et al., 2002; Martin & Dinella, 2012), some studies let participants give an answer other than “yes” or “no” (Halim et al., 2011; Ahlqvist et al., 2013). As a result of using different criteria, drawing comparisons between different samples is challenging, and estimates of the prevalence of tomboy identification fluctuate widely across studies from around 30% (Martin & Dinella, 2012) to more than 50% (Plumb & Cowan, 1984).

Summary of findings.—As in the previous lines of work reviewed, much of this literature examines play preferences, interest in gender-stereotyped activities, and playmate preferences. One of the earliest studies emphasized that self-identified tomboys preferred stereotypically masculine play activities and boy playmates much more than other girls (Green et al., 1982). However, subsequent research found that they do so less than their brothers (Bailey et al., 2002), and do not necessarily show a within-group preference for masculine-typed interests or activities over feminine ones, but rather prefer both equally (Plumb & Cowan, 1984; Martin & Dinella, 2012; Ahlqvist et al., 2013). These studies suggest that tomboys' preferences may be flexible and perhaps androgynous in the sense indicated by Bem (1974), meaning that they are high in both masculine and feminine qualities.

Research on tomboys has also investigated their beliefs about their own identity, what it means to be a tomboy, and gender stereotypes. Tomboys showed substantial variability in their understanding of their own gender, with (surprisingly) almost half of tomboys in Bailey et al. (2002) reporting a gender identity that was more feminine than their non-tomboy sisters. Conversely, Ahlqvist et al. (2013) assessed gender identity by measuring participants' felt gender typicality and gender contentedness, and found that tomboys were less likely to be content with being a girl than non-tomboys. When asked about what being a tomboy means to them, tomboys in Ahlqvist et al. (2013) were more likely to associate being a tomboy with flexibility as opposed to exclusive identification with masculinity. In the stereotype domain, Martin & Dinella (2012) showed that while tomboys and other girls did not differ in the extent to which they recognized gender stereotypes as flexible and variable, tomboys were more likely to recognize variability in girls' activity preferences. Moreover, relative to non-tomboys, tomboys showed less congruence between their personally-held stereotypes (whether they thought activities were “for girls” or “for boys”) and their own preferences (whether they thought activities were “for them” or “not for them”). In a similar vein, tomboys were more accepting of others' gender norm transgressions than children who did not identify as tomboys (Ahlqvist et al., 2013). Taken together, these findings suggest that tomboys may have less rigid views of what it means to identify with any particular gender.

Contributions of this literature.—Research on tomboys provided a spotlight on gender diversity in female children, who were generally not the focus of research on gender diversity in childhood in the middle and later half of the 20th century. This work showed that tomboys are girls whose preferences and interests often fall in between those of gender-conforming boys and gender-conforming girls, or as Ahlqvist et al. (2013) describe, “girls with options”. Moreover, this research suggests that tomboy identity is common, thus highlighting the substantial variability in gendered behavior and cognition that exists within female children; one might even wonder, based on some of these estimates, whether being a tomboy (at least at some point in childhood) is an aspect of modal gender development in girls. Finally, this research exposed variability in developmental trajectories in a non-stigmatizing and non-pathologizing way.

Limitations and critiques of this literature.—The most common issue present in the research literature on tomboys—and one that is acknowledged by virtually all of the authors whose work we review—is that the label of “tomboy” is neither clearly defined nor consistently assessed (i.e., by girls’ self report vs others’) across studies. As a result of discrepancies between researchers’ definitions and assessment of tomboy identity, generalizing findings beyond individual studies is difficult. Further, the relative scarcity of work in this area, despite the high number of youth who potentially could be included in such studies, is a limitation.

Summary of reviewed literature across all four groups.—What are the most important overarching findings from the reviewed literature on gender-referred children, transgender children, assigned female children with CAH, and tomboys? First, when taken together, these four literatures provide a description of the wide variability in children’s gender development not present in most of the existing literature on gender development, which has highlighted the modal developmental pattern, at least in early childhood. Further, some of these literatures demonstrate and emphasize variability within each group; for example, transgender girls show preferences for toys that range from very stereotypically feminine ones to more neutral or even stereotypically masculine ones (Gülgöz et al., 2019b).

These commonalities aside, it is often difficult to make comparisons between the four groups of children, for two reasons. First, the groups were generally studied separately and with different measures, thus making it difficult to compare the groups quantitatively. Second, many of the measures administered to children in past research have been binary and categorical in nature (e.g., asking children to pick one gender rather than asking them to indicate how closely they relate to boys and girls on a spectrum), which has diminished researchers’ ability to detect smaller changes in children’s gender development. In other words, past measures may have been too coarse to produce observable change, since (for example) shifting from a sense that you are a boy to a girl is a much larger change than a shift from feeling you are strongly identified as a girl to feeling you are moderately identified as a girl. In the last section of this article, we return to these themes, arguing that the unified use of more continuous conceptualizations of gender identity and gendered behaviors may allow researchers to more rigorously capture variability in individual trajectories.

The existing literature is also limited in its ability to explain how children in each group arrived at a sense of their gender in the first place. This is largely because work with gender diverse children involves children who have already reached a fairly stable gender identity (though research could also study children whose sense of their gender changes later in development). This particular question of where gender identity comes from has been the subject of intense debate over the years, spawning various theoretical traditions that assign differing importance to social (e.g., Mischel, 1966; Bussey & Bandura, 1999), cognitive (e.g., Bem, 1981; Martin & Halverson, 1981), and biological (e.g., Collaer & Hines, 1995; Hines, 2009) factors in shaping gender outcomes. While the work we have reviewed thus far does not provide definitive answers to settle this debate, it does bear on the debate in interesting ways. In the next section, we turn to the ways in which research with gender

diverse children interfaces with work that highlights the social, cognitive, and biological determinants of gender development.

Factors shaping gender development and their implications for development in gender diverse children

How can the above findings about gender development in gender diverse children be understood with regard to the factors which have historically been theorized to impact gender development? Here, we briefly summarize work that emphasizes social, cognitive, and biological determinants of gender identity, and highlight their relation to gender diversity. Importantly, some researchers have written about factors that might explain the etiology of specific gender diverse trajectories (e.g., Zucker et al., 2012), but here we review work that has primarily described gender development more broadly, since work describing gender diverse behaviors has tended to focus on clinical applications. Importantly, scholars who champion the importance of each of these broad classes of factors (social, cognitive, biological) typically acknowledge that all three impact gender development, but differ on which they emphasize in their theoretical work.

Social factors.

One factor often thought to contribute to gender development is the social and cultural environment. The application of social factors to gender development in modern psychology is considered to have its origin with Mischel (1966), who argued that children acquire gendered behavior, preferences, and stereotypes via reinforcement from the social environment (e.g., parents, peers, media, etc.). Researchers' accounts of how social factors actually shape gender development have been refined and reworked throughout the years; as an example, Bussey & Bandura (1999) posited Social Cognitive Theory (SCT), which emphasized how children learn by observing others' modeled behavior.

With regard to gender diversity, some clinical psychologists have believed that socialization (e.g., parents thinking it is cute if a boy does something feminine and therefore encouraging it) is a mechanism that leads to gender nonconformity, and have consequently tried to leverage socialization principles to modify children's behavior so that it conforms to gender norms. As an extreme example, Rekers et al. (1976) attempted to change a child's gender identity using a token reinforcement system, supplemented by punishments such as spanking. While it is generally agreed upon today that such "reparative therapies" are harmful, unethical, and should be avoided (Rafferty et al., 2018; American Psychological Association, 2015; American Medical Association, 2019), it is worth noting their existence as an instantiation of social learning theories applied to gender diverse (and sexual minority) youth in the field of psychology.

Sociocultural influences undoubtedly play a role in children's understanding of gender. For example, it is at least partially, if not entirely, through the social environment that children learn which behaviors and objects are associated with different genders. Children would not know that magenta blocks and leggings are "for girls", but navy blocks and cargo shorts are "for boys", without sociocultural influences. In fact, gender diverse children are undoubtedly

getting the same information from about gender from the broader culture as their gender-conforming peers: for example, transgender girls are more likely to want to wear skirts than transgender boys, suggesting that they too are internalizing social information about how one enacts gender.

However, socialization (through punishment and reinforcement, or mirroring same-sex others' modeled behavior, Bussey & Bandura, 1999) is unlikely to be the mechanism that accounts for children's sense of their own gender in the first place. Early-identifying transgender children illustrate why: they show fairly consistent patterns of gender identity and expression that conflict with the explicit messaging they received in their early sociocultural environments. For example, the transgender youth studied to date were initially raised as a binary gender that was at odds with their identity. Photographs from their childhood show that they were initially raised as the gender associated with their sex assigned at birth (Gülgöz et al, 2019) and many families reported a negative response to their child's gender nonconformity initially (though others report having responded neutrally or positively). Thus, for example, transgender girls' desire to wear skirts, label themselves as girls, and socialize primarily with girls, demonstrates their exposure to societal information about gender, but it is unlikely that explicit socialization (i.e., from parents or other adults) is the mechanism that shapes their identities and gender expression.

Cognitive factors.

Another factor that has been theorized to drive gender development is children's own cognition (i.e., thinking) about gender, such as their beliefs about gender constancy, stereotype knowledge, and gender schemas. Cognitive factors underscore the child's active role in understanding and creating their gender identity and expression, rather than passively accepting social reinforcement or messaging. One of the first psychological accounts of gender development that stressed the importance of cognitive factors was by Kohlberg (1966), who, with a tight connection to the Piagetian stage-like school of developmental theory, argued that once children achieve gender constancy, they search for clues in the environment that tell them which behaviors are appropriate for someone of their gender. Work since Kohlberg has posited other consequential cognitive factors. A particularly influential one is the gender schema, (Bem, 1981; see also Martin & Halverson, 1981), a cognitive structure that organizes future information processing about sex-typing and gender stereotyping in a "top-down" way. A well-known empirical result thought to exemplify the role of the gender schema is that children will distort their memory of characters in storybooks or people in pictures so that they square with their existing gender stereotypes (for example, misremembering a boy who was playing with a doll as having been a girl; Martin & Halverson, 1983b; Frawley, 2008).

Gender diverse developmental outcomes speak to the role of cognitive factors. The fact that transgender children show preferences that align with their gender, rather than the gender of their early socialization, has been used as evidence that children are 'self-socializing,' meaning that they use their cognitions about their own gender to guide what cultural artifacts of gender they subsequently seek out or enact. As an example, a transgender boy may be receiving messaging from social partners that he is a girl, but his own sense of

gender identity is thought to lead him to observe that the boys around him play with trucks, and thus adopt that preference himself (Gülgöz et al., 2019b). This early gender cognition may explain why gender diverse identities persist in the face of discouragement or punishment from the social environment, since children's own sense of their gender, rather than messages from the social environment, would be the primary driver of children's learning about gendered behavior.

What aspects of gender diverse development do cognitive factors not explain? First, they do not explain how children's most basic gender cognitions (e.g., that they are one gender or another) arise in the first place. Further, they may not explain cases where a child's gender identity and gender-typed behaviors diverge. For example, assigned female children with CAH most often identify as girls but tend to prefer stereotypically masculine activities and toys. If a child's sense of gender identity is driving their search for how to enact that gender, then we might expect for children with CAH who identify as girls to develop more stereotypically feminine preferences than the existing evidence suggests they do.

Biological factors.

Decades of research have argued for the importance of biological - that is, genetic and hormonal - determinants of gender identity and gendered behavior. A particularly well-studied mechanism concerns the neurobiological processes affected by androgens and estrogens, and how these processes have downstream consequences on stereotypically gendered behaviors and gender identity. The literature reviewed above on gender development in children with CAH is a hallmark of this perspective. Other work has emphasized variation in gender development of children with complete androgen insensitivity syndrome (Hines et al., 2002) and intersex traits associated with higher fetal androgen exposure (Slijper et al., 1998). Aside from work investigating the specific role of fetal androgens, some studies with monozygotic and dizygotic twins have examined the relative influence of genetic and environmental factors on stereotypically gendered behavior, and have generally found that both genetics and shared environmental factors play a role in shaping these behaviors in both boys and girls (Iervolino et al., 2005; Elizabeth & Green, 1984).

Work investigating biological determinants of gender development has made a substantial contribution, as described in our review above, by linking androgen levels in the prenatal environment to gendered behaviors in childhood (Hines, 2009; Hines, 2011). However, the explanatory power of biological factors is largely limited to work with clinical populations. Studies aiming to link children's interest in stereotypically male play styles and toys with testosterone levels measured in maternal blood (Hines et al., 2002) or amniotic fluid (Auyeung et al., 2009; Knickmeyer et al., 2005; van de Beek et al., 2009) have shown inconsistent, and sometimes null, results (Hines et al., 2015). There are also many other biological variables that could plausibly impact gender development (e.g., hormone levels during the infancy "mini puberty", or other genetic factors) that are much less well understood. Finally, the biological mechanism by which hormones might impact gender development, as well as the reason that some domains (e.g., toy preferences) seem to be more impacted by fetal androgen levels than others (e.g., gender identity), remains elusive.

The future of research on the gender development of gender diverse children

After more than six decades of research, we have achieved a greater understanding of gender development, including that of gender diverse children. Notably, gender development shows wide variability: most children identify closely with the gender associated with their assigned sex, but others identify more closely with another gender, or show behaviors and preferences stereotypically associated with another gender. Evidence to date mostly suggests that gender diverse children do not conceptualize gender (in terms of essentialism, stereotypes, and constancy) in a dramatically different way than their gender conforming peers; when differences are observed in these areas, they tend to be small. This observation indicates that in spite of unique individual trajectories of gender experience, general ideas about how gender operates might be shared by larger swaths of youth. Finally, work with gender diverse children demonstrates that social, cognitive, and biological factors all play unique roles in shaping children's gender-related behaviors and cognitions.

However, key questions remain unanswered. Across cultures and ages, researchers do not have a good grasp on the relative frequency of various forms of gender diverse behavior and identity in the general population of children and how these are or are not changing over time (though there have been attempts to quantify the prevalence of gender dysphoria in youth at specific points in time or in specific samples, e.g., Zucker & Lawrence, 2009). We still have very little understanding of less binary gender identities and children whose sense of their gender changes over time. Existing knowledge about gender diverse development usually pertains to children old enough to know their gender, but the process by which gender diverse children acquire this knowledge at earlier developmental time points (and the extent to which this process might differ from modal gender development) is poorly understood.

We have no clear answer to these questions, but we do contend that to answer them rigorously, future research and theory must be inclusive and widely applicable, building on insights from a wider swath of children than just those who show modal gender development. In this spirit, we suggest four methodological considerations for scholars interested in gender development, with the hope that these considerations will help to integrate the full gamut of variation in gender development into future research.

Viewing gender as a spectrum.

The literature we have reviewed so far has, in general, placed children into one of two categories based on their assigned sex, the status of their gender identity as concordant or not with their assigned sex, or whether they showed gender nonconforming behavior (e.g., tomboys). The measures presented to participants are often similarly categorical and binary: researchers often only present children options of, for example, identifying as a boy or a girl, or measure time spent with toys considered masculine or feminine (though some measures include a neutral option). As a result, this approach risks exaggerating differences between children's gender identification and expression and presents a high bar for (for example) showing change in gender identity. Going forward, an approach that recognizes continuous

variation in gender development—in terms of participants and measures—is warranted. Indeed, the very framework we have been using in this paper (considering certain children’s development to be “gender diverse” and others’ to be “modal”) may not be an optimal taxonomy.

This idea is not entirely new: scholars have written about measuring gender multidimensionally or on a spectrum for decades (e.g., Bem, 1974; Egan & Perry, 2001; Martin et al, 2017; Tate et al, 2014). These approaches demonstrate that gender identity can be thought of as a multidimensional, continuous construct with connections to meaningful psychological outcomes (e.g., adjustment and self-worth; Carver et al., 2003; Yunger et al., 2004; Corby et al., 2007). If researchers build on these conceptualizations of gender identity, they will be able to more rigorously capture variation in gender outcomes in childhood, including the variation that exists within any given category of children. We recognize this is a difficult task: determining how to explain gender continua to young children, for example, is not trivial. However, methodological adjustments can make these changes more feasible; for example, illustrations can facilitate children’s understanding of continuous scales.

Sample expansion and diversity.

Variation in gender development exists everywhere, but the psychological literature on gender diverse development outside of the U.S., Canada, and Europe is extremely limited. When researchers have asked about gender development outside of these locations, it often involves asking gender diverse adults to retrospectively report on their childhood experiences, rather than assessing children themselves (e.g., Gómez Jiménez et al., 2020). The scarcity of gender development research outside of a handful of countries is a major limitation, particularly because we know there are a range of gender experiences that are more common (or only occur) in places outside of the US, Europe, and Canada. One example is the *bacha posh* of Afghanistan—females who are raised as boys usually until puberty because of the need for a son (Nordberg, 2015); another is children growing up among the Vezo people in Madagascar who view gender as modifiable across the lifespan (Astuti, 1998). To our knowledge, experiences like these have not been studied systematically. As a result, the generalizability of current empirical findings and theoretical frameworks to other cultural contexts is unknown. Going forward, researchers will need to expand their samples past the U.S., Canada and Europe if they wish to document the full range of gender diverse development.

Integration across subfields.

In the work reviewed above, gender identity was often measured differently in each of the four subgroups, making comparison across subgroups difficult. We suggest that researchers in distinct subfields use more unified measures, as opposed to ones that are idiosyncratic to particular sub-categories. This suggestion builds off of the earlier recommendation about measuring gender as a continuous, multidimensional construct, but goes further: here, we argue that whatever measures of gender identity and gendered behavior researchers decide are appropriate should be adopted across subfields. This is an ambitious proposal, since researchers from different traditions often disagree about how gender and gendered behavior should be defined or measured. However, researchers need not adopt an entirely

standardized battery of measures, or stop using measures specific to their interests, in order to benefit from this suggestion. Rather, a few core measures shared among researchers would aid in interpreting findings from different researchers: for example, it would allow us to understand more precisely if and how the gender development of tomboys differs (or not) from that of girls referred to gender clinics.

Importantly, we recognize the tension between this suggestion and the suggestion that researchers should expand the cultural reach of their work: it is likely that when cross-cultural samples are included, measures cannot be entirely standardized, because (for example) cultures differ in how certain toys, activities, or clothes are seen as gendered. Nonetheless, we believe that carefully constructed standardized measures – with some adjustments to make these measures appropriate in distinct cultural contexts – could allow researchers examining different groups of children to more easily compare their results.

Cross-discipline, large-scale collaborative projects.

Finally, and perhaps most ambitiously, we argue that cross-discipline, large-scale collaborative projects could be useful towards integrating gender diversity into research on gender development. In this case, we are envisioning teams of gender researchers—including those who study modal gender development and those who have access to rarer samples—banding together for large collaborative projects. Alternatively, we could imagine a large, multi-lab longitudinal study that aims to amass a large sample before children engage in clearly gendered behavior, in hopes of recruiting a full swath of gender experiences across the early years.

As part of such studies, it would be important to examine how culture (both within and between countries) exerts influence on gender development, especially given the general scarcity of cross-cultural research on gender development mentioned above. Moreover, emphasis on cultural determinants of behavior tends to appear mainly when considering minoritized, “non-Western”, or non-White populations (Causadias et al., 2018), but cultural context is consequential in every child’s development. Measures of cultural attitudes and conceptions about gender assessed in large, diverse samples, paired with a comprehensive battery of gender measures given to children in diverse locations around a country, continent or throughout the world, would undoubtedly produce fascinating results.

All of these projects are complex, ambitious, and require the type of collaborations that are admittedly hard to coordinate and fund. However, such collaborations might greatly increase the ability of future research to capture the full variation present in gender development. As multi-lab studies in developmental psychology such as the ManyBabies project (i.e., Frank et al., 2017) are becoming better appreciated, we expect that this model will be more appealing to researchers.

Conclusion

After considering key research findings and theory from past gender development research, we are arguing for a more inclusive and integrative approach to the developmental science of gender. Whether our goal as researchers is to describe the full extent of variation in

gender development, or to go further and try to understand the environmental and biological factors that underpin this variation, a common language for describing gender identity and development would be immensely beneficial—particularly one that emphasizes a continuous spectrum of gender identities and gender-typed preferences, rather than highlighting discrete boundaries between categories of people.

Two final considerations are crucial in assuring that future work is inclusive of the full variability in gender development. First, we hope that research teams investigating these topics begin or continue to include gender diverse people when conceptualizing key questions in this space. For too long, it has been assumed that being cisgender or gender-conforming provides a more “objective” view on gender, but all gender trajectories provide a particular vantage point with a unique set of baked-in assumptions. If our goal is to understand the full spectrum of gender diverse experiences, it will require a range of perspectives from which one can develop hypotheses and insights. Second, we hope that gender diverse children’s preferences, behaviors, and identities will not be problematized by researchers. Research on gender development has often contributed to the stigmatization and pathologization of gender diverse children in clinics, schools, and other foci of children’s social lives. In order to reach our ultimate goal of understanding the full range of human gender development, we must acknowledge the harm done and move toward a future in which variation in gender development is learned from and celebrated. As societal debates about gender expression, identity, and autonomy bring gender diverse children into sharper focus, developmental scientists have a unique opportunity to increase public awareness of the many trajectories of gender development. Doing so can advance fundamental scientific understanding while also improving the lives of the gender diverse youth.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Term Definition

Assigned sex

The sex declared at or before the child’s birth typically based on external genitalia or sex chromosomes

Cisgender

A person whose gender identity aligns with their birth-assigned sex; these youth are described in the “modal” gender development sidebar.

Clinical controls

Children who were referred to psychological or medical treatment for issues unrelated to gender development.

Congenital Adrenal Hyperplasia (CAH)

Group of genetic variations that affect the adrenal glands and often result in greater androgen exposure and cortisol deficiency in utero

Gender-conforming children

Children who were not identified as showing marked gender nonconforming traits, behaviors, and preferences, or those who have experienced “modal” gender development

Gender diverse children

Umbrella term referencing children who identify with a gender other than their binary birth-assigned sex and/or show consistent gender nonconformity

Gender dysphoria

The experience of distress associated with an incongruence between one’s birth-assigned sex and one’s gender identity

Gender identity

A person’s sense of their own gender, for example, as a boy, girl, or nonbinary person

Gender nonconforming

Describing traits, identities, behaviors, and preferences that run counter to cultural stereotypes expected of children of a certain assigned sex

Gender-referred children

Children who showed gender nonconforming behavior and are referred to clinics specializing in the assessment and treatment of gender nonconformity

Modal gender development

The statistically most common trajectory of gender development, or the development shown by cisgender, gender conforming children

Nonbinary

A person identifying as neither or both “boy” and “girl”, or a combination of genders; related terms: genderqueer, gender fluid

Tomboys

Girls who show some stereotypically masculine behaviors or “boyish” interests

Transgender

A person who identifies as a gender other than the one assumed based on their birth-assigned sex

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Key Findings in Modal Gender Development

Research documenting modal gender development has found that infants discriminate gendered faces as early as 3–4 months of age (Leinbach & Fagot, 1993; Quinn et al., 2002). By their third birthdays, children associate binary gender labels with faces, toys, and activities (Campbell et al., 2002) and categorize themselves into binary gender categories (Thompson, 1975). Children’s gender stereotypes take root around 2–3 (Kuhn et al., 1978; Poulin-Dubois et al., 2002), and peak in rigidity around 5–7 (Halim & Ruble, 2010), years of age; stereotype application becomes more flexible as children age (Carter & Patterson, 1982). Starting in preschool, children show preferences for toys and clothing stereotypically associated with their gender (Emmerich & Shepard, 1982; Halim et al., 2014; Weinraub et al., 1984); boys tend to engage in more rough-and-tumble play (DiPietro, 1981). By early childhood, children show same-gender peer preferences in naturalistic (Maccoby & Jacklin, 1987; Martin & Fabes, 2001) and lab (Martin, 1989; Shutts et al., 2013) settings. Children’s essentialist gender beliefs—that differences between genders are inborn, biological, mutually exclusive, and unalterable—develop early (Gelman, et al., 2004; Taylor et al., 2009) and persist through adolescence (Gelman & Taylor, 2000); children also view gender as relatively stable by early childhood (Slaby & Frey, 1975; Emmerich et al., 1977; Martin & Halverson, 1983a).

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