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One tacit assumption in social psychology is that people learn gender stereotypes from their environments. Yet, little research has examined how such learning might occur: What are the features of social environments that shape people's gender stereotypes? We propose that nonverbal patterns communicate *intersubjective gender norms* (i.e., what behaviors people value in women and girls vs. men and boys). Furthermore, we propose that children develop intersubjective gender norms in part because they are commonly and consistently exposed to these nonverbal patterns. Across three studies, we tested the hypotheses that (a) children are frequently exposed to a nonverbal pattern of gender-role bias in which people respond more positively to gender-stereotypical than counterstereotypical girls and boys and (b) emotionally perceptive girls extract meaning from this pattern about what behaviors others value in girls (traditionally feminine behavior) and boys (traditionally masculine behavior). Study 1 indicated that characters across 12 popular U.S. children's TV programs exhibited a small, but consistent nonverbal bias favoring gender-stereotypical TV characters. In Study 2, girls ($N = 68$; 6–10 years) felt more pressure to be feminine after viewing TV clips that included traditional nonverbal bias than after viewing clips that reversed this bias. As predicted, these results held only to the extent that children could accurately decode nonverbal emotion (i.e., were emotionally perceptive). Study 3 replicated these results ($N = 91$; 6–11 years).

Keywords: gender stereotyping, socialization, nonverbal behavior, social development, intersubjective norms

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People around the world expect girls and women to have different characteristics than boys and men, and scientists often trace differential treatment to these expectations. Accordingly, there now exist volumes of research describing the antecedents and consequences of *gender roles*: consensual expectations for the behaviors and characteristics of boys and men versus girls and women (Bussey & Bandura, 1984; Eagly & Steffen, 1984; Halim et al., 2017; Hoyt et al., 2009; Lamer & Weisbuch, 2019; Plant et al., 2000). Gender roles may thus be regarded as culturally shared knowledge about how girls and boys are expected to behave. Psychologists have focused on how these gender roles impact how individuals think and behave. Such social influence assumes that people learn what *other people* expect from girls versus boys, not just what they *themselves*

expect from girls versus boys. Furthermore, people think and behave in a manner consistent with their consensual expectations, not just their individual expectations. Yet when scientists have examined children's and adults' beliefs about gender roles, they have often focused on personal endorsement—rather than knowledge—of those gender roles. In this article, we focus our efforts on identifying the antecedents and consequences of gender-role knowledge. In particular, we focus on one kind of gender-role knowledge: *intersubjective norms*, or beliefs about what other people believe and value.

A burgeoning literature in cultural psychology suggests that intersubjective norms uniquely predict individual's behavior, over and above those individuals' personal beliefs or values (Chiu et al., 2010; Shteynberg et al., 2009; Zou et al., 2009). In fact, the influence

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of intersubjective norms on judgment and behavior often dwarfs the influence of personally held beliefs and values. In one study, for example, personal endorsements of individualism did not explain cultural differences in decision-making, whereas beliefs about *others' endorsement* of individualism did explain cultural differences (Zou et al., 2009). Yet, there is little evidence for how children develop intersubjective norms, or whether children's behavior reflects these norms. We hypothesized that children develop intersubjective gender norms (equivalent to knowledge of how much others endorse traditional gender roles) through a cultural learning process. Specifically, by observing others' emotional responses to girls' and boys' behavior, children may learn what sorts of behaviors are valued in girls versus boys. Further, we predicted that these intersubjective norms would uniquely predict children's gender-role behavior. Ultimately, we argue that intersubjective norms may play an important and underappreciated role in the impact that traditional gender roles have on children's beliefs and behaviors.

We tested these hypotheses in the context of media effects, where there remains debate about if and how media content influences children and adults (Bushman & Anderson, 2021; Coyne et al., 2019; Ferguson, 2015; Ferguson et al., 2017). In Study 1, we quantified the extent to which U.S. children's TV programming includes a nonverbal bias. Specifically, we tested whether TV characters exhibit more positive nonverbal responses to gender-stereotypical than counter-stereotypical children. We then manipulated this nonverbal pattern in two experiments and examined how it affected girls' intersubjective gender norms, personal beliefs, and gender-role behavior.

Intersubjective Norms and Nonverbal Behavior

Intersubjective gender norms have been examined in a variety of domains, ranging from how much men think other men value communal traits to how much children think others hold traditional gender stereotypes (De Souza & Schmader, 2021; Jerald et al., 2017; Rubin et al., 2019; Van Grootel et al., 2018). Indeed, people tend to hold strong and reliable intersubjective norms. For example, people tend to underestimate the extent to which men think sexism is problematic, college students tend to overestimate the extent to which other students approve of the drinking habits at their university, and Americans tend to overestimate the extent to which other Americans value specific attributional styles (De Souza & Schmader, 2021; Miller & Prentice, 1994; Zou et al., 2009). And these intersubjective norms have important outcomes: men are less likely to speak out against sexism when they think their peers hold sexist beliefs and women engineers report a better sense of fit when they believe coworkers value inclusion (De Souza & Schmader, 2021; Hall et al., 2021). Given the implications of intersubjective norms for human behavior, we focused on how children learn intersubjective norms related to gender.

Despite converging evidence for the importance of intersubjective norms in human judgment and behavior, there is limited evidence on how people learn intersubjective norms, especially children. Some research with adults indicates that intersubjective norms can be manipulated through mere exposure, explicit statements, or intergroup contact (Kredentser et al., 2012; Kwan et al., 2015; Lowery et al., 2001). For example, there is evidence that repeated exposure to nonverbal behavior can influence intersubjective norms: seeing TV characters express more positive emotion toward slim than average-weight women caused adult participants to believe that

other people (in general) preferred slim to average-weight women (Weisbuch & Ambady, 2009). However, it is likely that people learn intersubjective norms before adulthood and consequently, such learning may depend on the development of advanced social-cognitive abilities. Put differently, advanced social-cognitive abilities may serve as a "gate" for the influence of environmental input on children's intersubjective gender norms.

Our theory for how children develop intersubjective norms integrates approaches from cultural psychology, social development, and human communication. Specifically, we follow cultural psychologists in distinguishing between private and public representations. *Private representations* refer to what psychologists often call "mental representations": an individual's beliefs and cognitive associations that live in an individual's mind and cannot be directly observed by others. *Public representations* refer to the physical manifestations of an individual's private representations, such as verbal or nonverbal behavior. Culture can then be understood as the private and public representations common to a collective group (Sperber, 1996). We follow Adams and Markus's (2004) extension of this framework and for this article, define *cultural patterns* as specifiable public representations commonly encountered by a collective (see also Weisbuch et al., 2017). We argue that children learn intersubjective norms in part by perceiving cultural patterns, so what they learn reflects the public representations common to their local ecologies.

The cultural pattern we focus on here is "nonverbal bias" (Weisbuch & Ambady, 2009; Weisbuch et al., 2009; Weisbuch & Pauker, 2011): the tendency for people to display more positive nonverbal behavior toward some things than toward other things. We reasoned that when children see a cultural pattern of nonverbal bias, they infer that people value some things more than other things. Although people may sometimes verbalize their preferences, they cannot help but consistently exhibit a stream of nonverbal behavior (Ambady et al., 2000). Accordingly, nonverbal behavior may provide a more consistent informational source for children to infer what others value—if those children have the capability to draw such inferences. Moreover, people appear to efficiently and unintentionally process the affective meaning of others' nonverbal behavior (Dimberg et al., 2000; Murphy & Zajonc, 1993; Tiedens & Fragale, 2003; Weisbuch & Ambady, 2009; Winkielman et al., 2005), suggesting that observing others' nonverbal behavior may provide a low-effort route toward learning intersubjective norms.

The process through which children learn intersubjective norms may therefore be akin to a social referencing process. Social referencing is a phenomenon frequently observed among children, in which their evaluations of things like toys are directly influenced by others' nonverbal responses to those same things (Hornik et al., 1987; Klinnert et al., 1983). For example, children in several studies avoided playing with a toy after seeing an adult respond negatively to either the toy or another person playing with that toy (Repacholi & Meltzoff, 2007). Expanding this body of literature, we argue social reference effects may not be limited to children's observations of one person's nonverbal biases: when children repeatedly observe *different* people exhibiting similarly positive nonverbal responses to an object, they may learn that "other people" (in general) value that object.

We thus reasoned that children develop beliefs about what other people value by observing others' nonverbal responses to different sorts of objects. Unlike prior studies on social referencing, we examined cumulative learning—child participants observed *many*

TV clips in which gender-stereotypical girls and boys elicited more (or less) positive nonverbal responses than counterstereotypical girls and boys. We assumed that children would generalize from that information to beliefs about what other people (not just the models) value. Specifically, we hypothesized that seeing TV characters express more positive emotion toward gender-stereotypical than counterstereotypical girls and boys would cause children to believe that their peers and parents prefer gender-stereotypical girls and boys. Thus, we tested the idea that children develop intersubjective gender norms as a function of the complex nonverbal patterns they see.

Intersubjective Gender Norms in Children

A complex array of cognitive skills likely impact whether children learn intersubjective gender norms from widespread patterns of nonverbal behavior, and many of these skills develop later in childhood. Specifically, children must have the ability to decode the *social meaning* of nonverbal behaviors. Although evidence from social referencing studies suggests that children as young as 1 year use others' nonverbal emotions to form attitudes toward objects and actions (Hornik et al., 1987), the emotion expressions in these studies are typically high-intensity, whereas the emotions children see in their lives are often quite subtle (Matsumoto et al., 2011; Sanders et al., 2018; Scherer et al., 2021). Furthermore, children do not reach adult levels of reading low-intensity negative emotions (e.g., sadness, fear) until middle childhood (ages 7–10 or so; Gao & Maurer, 2009). Thus, children without advanced emotion perception abilities may have difficulty learning from the low-intensity emotion expressions that are most common to their ecologies. For this reason, we assumed that children with advanced emotion perception abilities would exhibit more learning from (nonverbal) cultural patterns than would children with less advanced emotion perception abilities. Such findings would support the view that learning about gender roles from cultural patterns of nonverbal bias depends on cognitive abilities involved in decoding nonverbal behavior.

The Current Research: Cultural Snapshots

In the current studies, we examined one possible source of children's intersubjective gender norms: their perceptions of how *other people* behave toward gender-stereotypical versus counterstereotypical children. We expected to identify a cultural pattern of nonverbal bias in which people display more positive nonverbal responses to gender-stereotypical than counterstereotypical children. Further, we expected that seeing this pattern of nonverbal bias would cause children to believe that others prefer girls and boys who display gender-stereotypical traits and behavior. As detailed above, we predicted that this effect would be moderated by children's ability to accurately perceive subtle nonverbal expressions of emotion. We also examined if such influence is unique to intersubjective gender norms, or if nonverbal bias also influences personal beliefs about what girls versus boys should do. Finally, we examined the extent to which intersubjective norms and personal beliefs uniquely predict children's behavior.

We tested these hypotheses in three experiments. Specifically, we examined the influence of cultural patterns of nonverbal bias on children's intersubjective gender norms by sampling nonverbal behavior from ecologies that U.S. children commonly encounter: popular TV shows. We chose this medium because it is a widely shared cultural context (nearly all American children watch television); exposure to a cultural pattern in this context could reasonably influence the beliefs of most American children. We circumscribed our cultural pattern and subsequent participant sampling to one national population (i.e., American children) since the television programming that is popular and that children have access to differs by region. In this article, our main goal was to provide initial tests of our theory, but given the results of the studies reported below, it will be valuable to test replications in other regions of the world.

We followed the cultural snapshots methodology to sample and characterize televised nonverbal bias (Pauker et al., 2019; Weisbuch et al., 2017). Cultural snapshots are brief recordings of public human behavior. The cultural snapshots paradigm requires two types of studies. First, we systematically sample a large number of snapshots from environments that the population of interest commonly encounters: in this case, popular children's TV shows in the U.S. This sample of snapshots was used (Study 1) to examine if nonverbal bias favoring gender-stereotypical children (*nonverbal gender bias*) constitutes a cultural pattern. Second, the same clips used to quantify the cultural pattern can be used to test the causal influence of a cultural pattern (Studies 2 and 3). We focused our data collection in Studies 2 and 3 on girls given that gender-role beliefs take an especially large toll on girls' self-esteem, possible selves, and resilience during early and middle childhood (Bandura et al., 2001; Bian et al., 2017; Stetsenko et al., 2000).[1] This approach enabled us to test the causal influence of a cultural pattern (nonverbal gender-role bias) in the complex social environments where children encounter it (e.g., televised interactions). Together, these three studies (a) quantify a cultural pattern that children frequently encounter and (b) test whether this pattern informs their intersubjective norms about gender.

Although not central to our primary hypotheses, several elements of our study designs have implications for research on media effects. Recent work on media effects has led to debates on the extent to which TV and other forms of media actually influence viewers' beliefs and behavior (Bushman & Anderson, 2021; Coyne et al., 2019; Ferguson, 2015; Ferguson et al., 2017). Our approach departs from standard media effects studies in several ways, and may therefore offer an alternative means of characterizing media effects. First, our approach is experimental and thus differs from the correlational designs frequently employed to test one of the most influential theories of media effects (cultivation theory; Coyne et al., 2014; Halim et al., 2013; Hammermeister et al., 2005; Martins & Harrison, 2012). Second, our approach differs from the experimental approaches that *are* employed in media effects—rather than randomly assigning participants to view one of several TV episodes or programs, participants view many short snippets from a representative sample of TV programs. Third, we specify a specific pattern in TV programs that may be influential, rather than more broadly testing the influence of a given genre (e.g., crime shows) on beliefs. Finally, our emphasis on intersubjective norms departs from the "personal beliefs" often measured in media effects studies (e.g., the impact of viewing crime on viewers' personal fear of crime). In Studies 2 and 3, we supplement our measures of intersubjective

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[1] However, boys, too, are negatively impacted by gender stereotypes, especially with regard to developing appropriate emotion regulation and expression (Chaplin et al., 2010; Fivush et al., 2000).

norms with measures of girls' gender-stereotypical behavior and personal beliefs. These measures enable us to compare the effects of media snapshots on intersubjective norms versus personal beliefs and behavior. Although there are limits to the external validity of the cultural snapshots methodology (see General Discussion section), the manipulations and measures employed here may have implications for the current scholarly debate on media effects.

Study 1

The purpose of Study 1 was to examine children's social ecology for cultural patterns of *nonverbal bias* associated with gender roles. Nonverbal bias occurs when members of one category are treated more positively than members of another category (Weisbuch et al., 2009). Following the established methodology, we selected gender-stereotypical and gender-counterstereotypical characters (i.e., *targets*) from U.S. children's TV shows to quantify how targets are treated by other characters (i.e., *expressers*). Specifically, we tested Hypothesis 1: Characters on children's TV programs will exhibit more positive nonverbal behavior toward gender-stereotypical (than counterstereotypical) children.

Method

Transparency and Openness

For all studies in this manuscript, we report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study. All data, materials, and analysis codes that can be shared publicly can be found at https://osf.io/yj62x/.[2] Data were analyzed using R, Version 4.1.0 (R Core Team, 2021) and the package *ggplot2*, Version 3.3.5 (Wickham, 2016). Studies 1 and 2 were conducted prior to widespread recommendations to preregister studies. Study 3 was conducted later and by then, preregistration had become normative. Its preregistration, including Study 3 design and analyses, can be found here: https://osf.io/xjm59

Participants and Setting

Adult participants were recruited from the Denver community via Craigslist to complete a 2-hr in-lab study and were paid $20 for their participation. We selected adult participant-judges because adults should be emotion experts and able to accurately rate the emotions in the clips (Zupan, 2015).[3] The experiment was conducted on computers using MediaLab software (Jarvis, 2017). To determine sample size, we consulted similar past studies where participants rated nonverbal behavior in television clips, and high interrater consistency was observed with 17–23 judges (Weisbuch & Ambady, 2009; Weisbuch et al., 2009). Thus, we randomly assigned 15–20 participants to evaluate one of two sets of clips (i.e., 35 participants in total; see description of how we divided clips below).

Materials

Following established methodology (Pauker et al., 2019; Weisbuch & Ambady, 2009; Weisbuch et al., 2009, 2016, 2017), we selected (a) a broad sample of popular shows on different TV networks with the highest viewership totals in the U.S., (b) clips from episodes that actually aired during the time period of interest, (c) characters *within* each show that were matched on appearance

frequency, race, and age, and (d) multiple snapshots of each character. Clips were sampled in accordance with a priori rules (see below), and steps b–d were performed by hypothesis-blind experimenters. These procedures helped to prevent biased selection of programs, episodes, characters, and snapshots.

Of the children's television shows that were airing, we selected 12 shows (e.g., *Scooby-Doo*, *Johnny Test*) and sampled nonverbal behavior from the episodes that were aired during the selection timeframe (e.g., during the months of June and July 2014; see Table 1). Of the available shows, we selected those that had well-matched gender-stereotypical and gender-counterstereotypical characters, which we later confirmed with post-tests (see Footnote 4). Specifically, we selected four characters per show: one stereotypical girl, one counterstereotypical girl, one stereotypical boy, and one counterstereotypical boy. All characters were matched on attractiveness, age, and status within the show. For example, from the television show *Johnny Test*, we selected Sissy (gender-stereotypical girl), Susan (gender-counterstereotypical girl), Johnny (gender-stereotypical boy), and Eugene (gender-counterstereotypical boy).

After selecting shows and characters, we took cultural snapshots: Each of three episodes per show was divided into three sections of equal length and, from each section, we sampled the first 10-s clip in which the target character could be seen interacting with another character (or characters) for at least 2 s (see Figure 1). We thus selected nine cultural snapshots per target character.

Each section of the episode had to contain different clips of all four target characters to be eligible. On some occasions, this was not possible because all four characters did not appear. Thus, more than three episodes were used to collect nine clips for some targets. Across 12 shows, we thus selected a total of 432 cultural snapshots to be evaluated by participant judges.

To prevent judges from being influenced by the gender or behavior of the other characters, we created two silent versions of each clip: one with only the expresser character visible and one with only the target character visible. Clips with only the expresser visible were rated for how positively the expresser was behaving toward the "unseen person" (i.e., the target). These ratings were used to quantify nonverbal bias, as described below. Clips with only the target visible were rated for how positively the *target* behaved toward the "unseen person" (i.e., an expresser). These ratings were used to rule out the possibility that the expresser's positive behavior toward a target was due to how positively the target behaved. Judges were randomly assigned to rate either the target or expresser clips. Fifteen judges rated the nonverbal behavior in the expresser clips, and 20 judges rated the nonverbal behavior in the target clips. Judges were thus blind to the identity of the unseen characters (i.e., the expressers in target clips and the target in expresser clips). Note that to confirm gender stereotypicality of characters, we had a separate set of judges evaluate the target clips for gender stereotypicality (see results in Footnote 4).

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[2] Videos of child participants from Study 3 are not shared to protect children's identities. The full set of clips from Study 1 is unavailable due to legal copyright. Any other materials that are unavailable on OSF may be requested directly.

[3] In Study 3, we also asked children to rate a subset of these clips (see Footnote 15). Children evaluated emotion similarly as did adults. Child ratings of expresser emotion from Study 3 and adult ratings of expresser emotion from Study 1 were strongly correlated, $r(95) = .88$, $p < .001$.
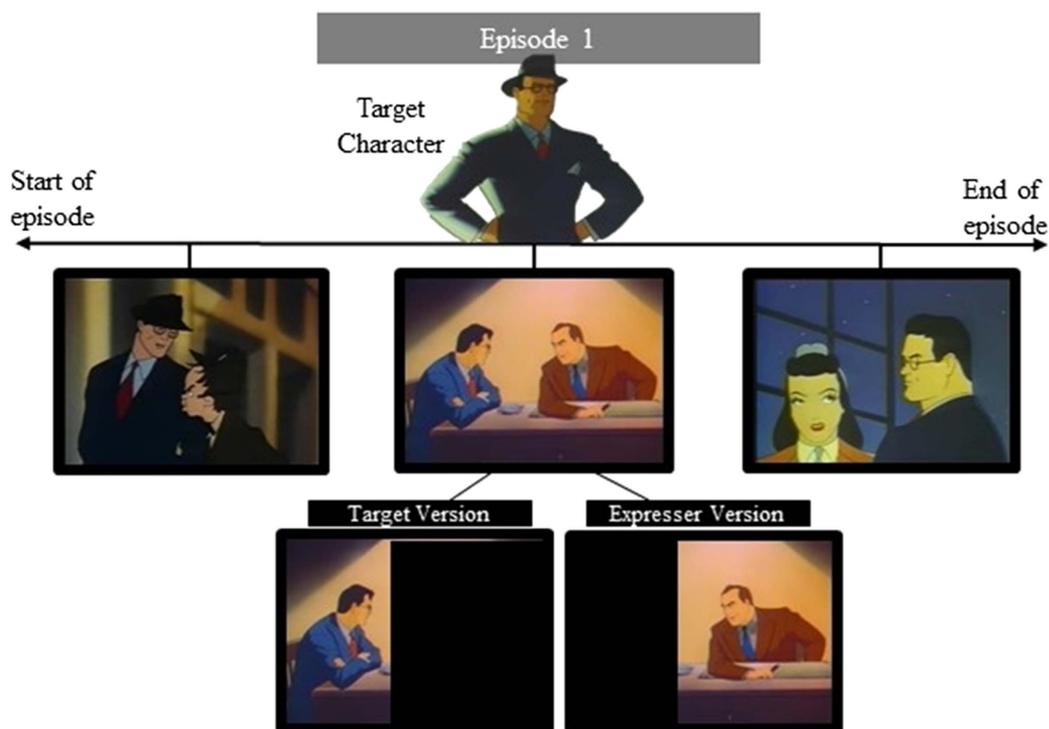
Table 1
Characters and Show Sampled in Study 1

Show	Stereotypical girl	Counterstereotypical girl	Stereotypical boy	Counterstereotypical boy
Avatar	Katara	Toph	Sokka	Aang
Camp Lakebottom	Suzi	Gretchen	McGee	Buttsquat
Danny Phantom	Jazz	Sam	Dash	Danny
iCarly	Carly	Sam	Spencer	Freddie
Jane and the Dragon	Pepper	Jane	Gunther	Jester
Johnny Test	Sissy	Susan	Johnny	Eugene
Liv and Maddie	Liv	Maddie	Diggie	Joey
Phineas and Ferb	Isabella	Candace	Buford	Irving
Shake it Up	Tinka	CeCe	Deuce	Gunther
Victorious	Cat	Jade	Beck	Robbie
Wizards of Wavery Place	Harper	Alex	Justin	Zeke

Procedure

Participants viewed each of the 432 silent 10-s clips (of *either* targets or expressers) and rated the clip on two questions about positivity and liking: (a) "How did the visible character(s) behave toward the "unseen" character?" (rated on a scale from $-3 = $ *Extremely negative* to $3 = $ *Extremely positive*) and (b) "How much did the visible character(s) like or dislike the "unseen" character?" (rated on a scale from $-3 = $ *Strongly Dislike* to $3 = $ *Strongly Like*).

This molar coding of emotion was preferred to molecular coding (e.g., number of smiles) because molar coding captures emergent properties and has been shown to be quite accurate in describing felt emotion, above and beyond the accuracy of molecular coding (Ambady et al., 2000; Weisbuch & Ambady, 2011; Widen, 2013). Furthermore, we focused on affective valence instead of specific emotions because valence seems to be more easily and immediately perceived by both children (Herba et al., 2006; Widen & Russell, 2008)

Figure 1
Method of Selecting and Editing Clips for Each Target Character

Note. For copyright reasons, we used Clark Kent from Fleischer and Fleischer (1941) as an example, since this show is in the public domain. However, we did not use this show in our study as it was well outside of our sampling timeframe. See Table 1 for the shows used in our study. For each show, we selected three episodes from the season and three clips from each episode, yielding nine clips per character, four characters per show, and 12 shows for 432 clips in total. We then edited each clip so that only the target was visible (i.e., Target Version) or only the expresser was visible (i.e., Expresser Version). See the online article for the color version of this figure.

and adults (Lindquist et al., 2014). Past studies have demonstrated high interrater reliability on similar items (i.e., αs greater than or equal to .83; Weisbuch & Ambady, 2009; Weisbuch et al., 2009). In the present study, α values were between .77 (Target) and .85 (Expresser). Additionally, similar studies provide evidence of a strong positive correlation between ratings on the two items used here (e.g., $r = .87$; Weisbuch & Ambady, 2009). In this study, we observed a strong positive correlation between the positivity and liking ratings for each clip: correlations between these two items ranged from $r(431) = .88$ for target clips to $r(431) = .95$ for expresser clips. Accordingly, nonverbal behavior was ultimately indexed by the average of positivity and liking (per clip; Expresser $M = 3.91$, $SD = 1.04$; Target $M = 4.33$, $SD = .98$). Ratings of the expresser clips were used to quantify nonverbal bias, and ratings of the target clips were used to test alternative hypotheses (see below). Adult judges rated *either* clips of targets or clips of expressers. Judges then completed a brief demographic question-naire before being debriefed and compensated.

Results

Data from this study yielded ratings of each clip across multiple raters. Therefore, cross-classified mixed-effects models were esti-mated to examine whether the gender and stereotypicality of the target influenced how expresser characters treated them (Judd et al., 2012, 2017). Mixed models were estimated in R (R Core Team, 2021) with the lme4 package (Bates et al., 2015) using Satterthwaite approximate degrees of freedom (i.e., lmerTest; Kuznetsova et al., 2017). Expresser nonverbal positivity and liking (heretofore, *expresser positivity*) was analyzed as a function of target gender, girl (1) versus boy (−1), target stereotypicality, stereotypical (1) versus counterstereotypical (−1),[4] and the interaction between them. The model contained random intercepts and slopes of participant and clip as possible within the model.[5] Consistent with Hypothesis 1, the predicted effect of target stereotypicality was significant, $b = .12$, $SE = .05$, $t(299.84) = 2.31$, $p = .022$, $\eta^2 = .017$ (see Figure 2).[6] Expressers displayed more positive nonverbal responses to gender-stereotypical target characters ($M = 4.03$, $SD = 1.07$) than counter-stereotypical target characters ($M = 3.79$, $SD = .99$). There was no effect of gender, $b = .04$, $SE = .05$, $t(400.39) = .86$, $p = .390$, $\eta^2 = .002$, and there was no interaction of stereotypicality and gender, $b = −.03$, $SE = .05$, $t(328.00) = −.68$, $p = .500$, $\eta^2 = .001$. Stereotypical characters were treated more positively than counterstereotypical characters regardless of whether the show was animated or not, $b = .03$, $SE = .05$, $t(424.00) = −.62$, $p = .539$, $\eta^2 = .001$, and independent of how early in the season the episode was, $b = .10$, $SE = .17$, $t(424.00) = .59$, $p = .553$, $\eta^2 = .001$. We conducted this latter test to rule out the possibility that treatment of counter-stereotypical characters improved over time, equaling treatment of the stereotypical characters by the end of the season.

One possible explanation for these effects is that stereotypical target characters themselves behaved more positively than did counterstereotypical characters, and only for that reason did ex-pressers respond more positively to them. If that was the case, an analysis of *target* emotion should yield the same pattern of effects with a main effect of stereotypicality. To examine this explanation, targets' nonverbal positivity and liking (*target positivity*) were analyzed in the same way as expresser positivity: as a function

Figure 2

Ratings of How Positively Expressers Interacted With Targets Based on Targets' Gender Stereotypicality and Gender
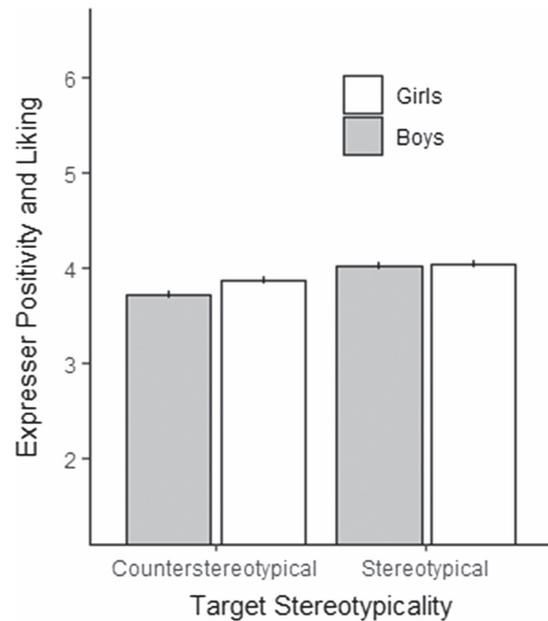
Note. Gender-stereotypical target characters elicited more positive nonver-bal behavior and liking than counterstereotypical target characters. The *y*-axis depicts 1.5 *SD* in either direction of the grand mean consistent with recommendations for effect size depiction (Witt, 2019).

of target gender, girl (1) versus boy (−1), target stereotypicality, stereotypical (1) versus counterstereotypical (−1), and the interac-tion between them, with random intercepts and slopes where the model allowed.[7]

The effect of target stereotypicality on *target* positivity was not significant, $b = .04$, $SE = .05$, $t(409.48) = .76$, $p = .449$, $\eta^2 = .001$, such that gender-stereotypical characters exhibited a similar degree of nonverbal positivity ($M = 4.37$, $SD = 1.00$) as counterstereoty-pical characters ($M = 4.30$, $SD = .95$). Of course, interpreting this effect requires that we interpret the null hypothesis. Interpretation of

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[4] To empirically examine whether TV characters were perceived to be gender-stereotypical and gender-counterstereotypical (as intended), 15 addi-tional adult participants evaluated the femininity/masculinity of each char-acter in each of the nine clips featuring that character. Each judge thus rated all 432 silent target clips, and these clips were presented in random order. Ratings were made on a 1 (*extremely feminine*) to 6 (*extremely masculine*) scale. These ratings confirmed our initial character selection; cross-classified mixed models accounting for nesting of target ratings within clip and participant indicated that stereotypical target characters were rated as more gender-stereotypical than counterstereotypical target characters, $b = −.27$, $SE = .04$, $t(58.38) = −7.21$, $p < .001$ (see Figure S1 in Supplemental Online Materials).

[5] We used the following formula: Expresser Positivity ~ 1 + Target Gender × Target Stereotypicality + (1|Clip) + (1 + Target Gender × Target Stereo-typicality|Subject).

[6] We used the *t*back method suggested by Correll et al. (2021) to calculate eta squared.

[7] We used the following formula: Target Positivity ~ 1 + Target Gender × Target Stereotypicality + (1|Clip) + (1 + Target Gender × Target Stereo-typicality|Subject).

null effects is a risky endeavor, but there are analytic tools that can help to reduce the risk of faulty interpretation of null effects. For example, recent advances propose using equivalence tests (Lakens et al., 2018) for this purpose (i.e., to examine whether effects are meaningfully different from 0). Refer to the Supplemental Online Materials for a full description of this test. To summarize, using the small telescope procedure recommended by Simonsohn (2015), the above effect of target stereotypicality on target positivity was smaller than the smallest effect size of interest (i.e., SESOI). Therefore, the analyses provide some support for the view that target emotion was not responsible for the observed effects: Expresser characters displayed more positive nonverbal behavior toward gender-stereotypical targets than counterstereotypical targets, but in our data, this relationship could *not* be explained by targets' own positive or negative behavior.

Discussion

Across 12 of the most popular TV shows targeted toward American children, we observed a nonverbal cultural pattern favoring gender stereotypicality. Thus, the results of Study 1 are consistent with the view that American children are regularly exposed to a subtle cultural pattern in which gender-stereotypical individuals are treated more positively than gender-counterstereotypical individuals. Importantly, the effect of gender stereotypicality on treatment was statistically small ($\eta^2 = .017$). However, this effect was consistent across different types of children's shows and across the show season. Therefore, it is likely that children are frequently exposed to this nonverbal bias. Exposure to this statistically small pattern may accumulate over days, months, and even years, so over time, it may have a large impact on viewers. Although these findings alone may be of interest, we were more interested in how children were influenced by observing this pattern. We hypothesized that repeatedly observing this pattern would cause children to believe that other people value stereotypical girls and boys (i.e., causing changes to children's intersubjective norms). We assumed that such influence would be specific to children who could read subtle and complex nonverbal displays of emotion.

Study 2

In this study, we explored how exposure to a cultural pattern of traditional nonverbal bias influenced girls' intersubjective gender norms. Girls viewed a set of silent, 10-s television show clips (i.e., the original clips from Study 1 depicting both target and expresser) and then completed a variety of outcome and moderator measures. One set (*traditional condition*) included 24 clips: 12 clips in which TV characters displayed positive nonverbal behavior toward gender-stereotypical characters (i.e., feminine girls; masculine boys) and 12 clips in which TV characters displayed negative nonverbal behavior toward gender-counterstereotypical characters (i.e., masculine girls; feminine boys). The other set (*reverse condition*) depicted the opposite nonverbal bias: more positive nonverbal behavior toward gender-counterstereotypical characters than gender-stereotypical characters. We recruited participants in the midst of middle childhood (between the ages of 6 and 11). During this time, children rapidly develop complex social perception abilities, especially in the domain of emotion perception (Nowicki & Duke, 1994; Pons et al., 2004; Rosenthal et al., 1979). We assumed that the development of the

ability to perceive subtle emotion displays would be critical for child perceivers for two reasons. First, although TV actors are often skilled at displaying prototypical positive and negative emotion, the displays that were captured by our sampling procedure were rarely high-intensity, prototypical displays. As seen in Figure 2, the emotional variance among clips was limited ($SD = 1.04$) and centered around the midpoint ($M = 3.91$) of a 1 = *extremely negative* to 7 = *extremely positive* scale. Thus, most nonverbal behavior displays varied from slightly negative (Q1 = 3.13) to slightly positive (Q4 = 4.64)—this is likely because our sampling procedure was *not* limited to highly emotional interactions. Instead, these clips were selected according to the rules noted in Study 1, with no emphasis whatsoever on selecting clips that included high- (or low-) intensity emotion displays.

A second reason that advanced emotion perception abilities may be important in this context is that perceiving emotion in a television scene is more complex than perceiving emotion in a static image of a floating face, as often occurs in emotion perception studies. Even cartoons, where visual complexity is simplified, still contain an array of complex visual cues that may be absent from typical stimuli such as brightness, depth cues, dynamic movement, eye gaze, animation style, scene category, and so on. We, therefore, assumed that children who were more adept at reading subtle displays of emotion would be better prepared to perceive characters' emotions in dynamic and perceptually rich TV scenes. Thus, we hypothesized a priori that emotion perception abilities would moderate the influence of nonverbal gender-role bias on gender beliefs.

Consistent with past work on cultural patterns (Weisbuch & Ambady, 2009), we hypothesized that the cultural pattern would have a direct impact on what girls thought other people—peers and parents—would think (i.e., intersubjective norms). We also measured girls' private beliefs and girls' gender-stereotypical behaviors. These measures were included to (a) examine whether direct effects of nonverbal bias were specific to intersubjective gender norms and (b) provide evidence on the relationships among intersubjective gender norms, personal endorsement of gender roles, and gender-stereotypical behavior. Consistent with prior work (Chiu et al., 2010; Shteynberg et al., 2009; Zou et al., 2009), we expected intersubjective norms—as compared to personal beliefs—to have an equal or stronger correlation with girls' behavior.

Method

Participants and Setting

Participants were recruited through an extensive community contact list compiled over 20 years in the Psychology Department at a university in Colorado. Based on collaborations with local hospitals, parents were contacted once their child was born and were invited to provide their contact information for future studies at the university. In total, there was contact information for 1,411 6–9-year-old girls on the list. We recruited participants in this age range to (a) focus on middle-childhood, (b) use a sample with a wide range of emotion perception skills, and (c) ensure all children within this sample would be able to complete the tasks (which were designed for this age group).

To determine sample size, we consulted past experimental studies that examined gender-typed modeling outcomes or social referencing effects. We focused conservatively on studies with younger children (3–8 years) to ensure that the sample size we chose would

be powerful enough even with younger children, who may have a harder time staying task-focused than do older children. In these studies, samples ranged from 18 to 32 children per condition (Bussey & Bandura, 1984; Castelli et al., 2008; Cimpian & Markman, 2011). Castelli et al., (2008) observed a moderately sized effect of nonverbal bias on beliefs ($d = .66$). Based on power analyses with G*Power (Faul et al., 2007), the estimated sample size to achieve .80 power with this effect size is 76 participants. Thus, we aimed to recruit 76 participants for this study, stopping data collection at the end of the academic term. Although this sample size is lower than some would recommend (e.g., 50 participants per condition, .90 power; Simmons et al., 2011), recruitment required an experimenter to devote several hours daily over a period of 6 months to recruit a sample of roughly 70 children (and parents) willing to participate in an intensive 2-hr experiment. A sample size of 200 participants would have been prohibitive. It is with this limitation in mind that Study 3 includes a preregistered replication and extension of Study 2.

To bolster our statistical power, we focused our recruitment efforts on girls for Studies 2 and 3. Gender roles are by their nature restrictive for both girls and boys. However, the adoption of gender roles may be particularly disadvantageous for girls who are taught that they are less competent, weaker, and lower status than boys, and who disengage from work in more socially valued domains (e.g., Science, Technology, Engineering, and Mathematics; STEM) that are dominated by boys and men (Bian et al., 2017; Halim et al., 2013; Karraker et al., 1995; Master et al., 2021). Although it is important to know how both boys and girls respond to patterns of nonverbal bias (and they may respond differently; Fivush et al., 2000), we were particularly concerned with how such patterns influence girls. We collected 69 participants in total by the end of the academic term and following the exclusion of one child who did not finish the study, the sample consisted of 68 girls, including 61 White, 1 Black, 1 Latina, and 5 multiracial participants ranging in age from 6 years, 1 month to 8 years, 11 months ($M = 7$ years, 5 months).

Materials

Experimental Manipulation.   Our hypothesis was that exposure to nonverbal gender-role bias would influence girls' intersubjective norms about gender. Therefore, we selected a set of clips to replicate the culturally prevalent pattern (*Traditional* condition) observed in Study 1, and a set of clips to reverse that pattern (*Reverse* condition; see Table 2). For each character, we selected the clip in which they were treated the most *negatively* and the clip in which they were treated the most *positively*, distributing them into their conditions,

respectively. For example, for Sissy, the feminine girl from *Johnny Test*, we included the clip in which she was treated most positively in the Traditional condition and the clip in which she was treated most negatively in the Reverse condition. Conversely, for Susan, the masculine girl from *Johnny Test*, we included the clip in which she was treated most negatively in the Traditional condition and the clip in which she was treated most positively in the Reverse condition.

We followed this procedure for each of 24 target characters (two characters per television program) with one caveat: we wanted to ensure that the main difference between conditions was whether the target received positive or negative nonverbal responses *from other characters*. Thus, it was important that the *target* exhibited similarly positive behavior in their clip selected for the Traditional condition and their clip selected for the Reverse condition. After initial clip selection, this was not the case for a few of the target characters. For those targets, we made clip substitutions to ensure that how positively *targets* behaved was similar across conditions.

We assumed that girls would encode the behaviors they observed in terms of a global gender-role bias—they would simply encode whether gender-stereotypical characters (regardless of their gender) received especially positive nonverbal responses from other characters. However, we acknowledged that such effects could in principle be specific to girls who observe girl target characters and designed the experimental manipulations to examine this possibility. Thus, we separated the Traditional bias clips and Reverse bias clips by *target* gender (i.e., girls or boys). For example, the *Traditional girls* set and the *Reverse girls* set each contained a clip of Jazz, the feminine girl from *Danny Phantom*. The difference between the Traditional and Reverse sets was only in whether the people interacting with Jazz displayed positive (Traditional set) *or* negative (Reverse set) nonverbal behavior, as determined by ratings from Study 1. Of course, the clip of Jazz was not the only clip in these sets (each set included 24 clips)—we use Jazz here to illustrate the conditions. Similarly, the *Traditional boys* set and the *Reverse boys* set each contained a clip of Dash, the gender-stereotypical boy from *Danny Phantom*. Again, the difference between the Traditional and Reverse sets was only in whether the people interacting with Dash displayed positive (Traditional set) or negative (Reverse set) nonverbal behavior.

Each of the shows examined in Study 1 was represented in each set of clips, so each experimental condition included many different programs and quite different contexts. These clips were the full, unedited, silent clips that contained both targets and expressers. Therefore, this set modeled the pattern of nonverbal gender-role bias observed in Study 1.

Intersubjective Norms.   Intersubjective norms refer to beliefs about others' values and are typically measured via self-report with

Table 2
Average Expresser Positivity and Liking for Clips in Each Condition

Character type	Traditional		Reverse	
	Girls ($N = 24$ clips)	Boys ($N = 24$ clips)	Girls ($N = 24$ clips)	Boys ($N = 24$ clips)
Stereotypical	5.57	5.83	2.92	2.95
Counterstereotypical	2.55	2.56	4.95	5.16

Note.   In the Traditional condition, clips featured stereotypical characters being treated positively and counterstereotypical characters being treated negatively. In the Reverse condition, clips featured counterstereotypical characters being treated positively and stereotypical characters being treated negatively. The same target characters were featured in both conditions. Positivity was rated on a scale from 1 to 7. Ratings of expresser positivity ranged from 1.50 to 6.37.

reference to specific "others." For 6–11-year-olds, parents and peers are salient and important figures in communicating gender roles to children (Barak et al., 1991; Gunderson et al., 2012; Skočajić et al., 2020). Accordingly, to index girls' intersubjective norms, we used the *felt pressure for conformity* scale (Pauletti et al., 2014), which measures the gender-role values that children attribute to their parents and peers. This measurement choice is also important for testing our hypothesis that nonverbal bias displayed by TV characters influences the gender-role beliefs children attribute to *real people*, even when those real people are as well known as parents or peers. The felt pressure for conformity scale (Pauletti et al., 2014) consists of seven items intended to measure how much pressure children feel from peers and parents to behave in gender-stereotypical ways. It is a modified version of the 10-item felt pressure scale (Egan & Perry, 2001) and has demonstrated acceptable reliability (Cronbach's $\alpha = .81$). The scale asked girls to respond to statements like "My parents would be upset if they saw me acting like a boy" and "The girls I know would be upset if I wanted to play with boys' toys" on a 4-point scale from 1 = *Definitely Not True* to 4 = *Definitely True*. Scores were calculated as an average of items after reverse scoring ($M = 2.24$, $SD = .59$), where higher scores indicate more pressure to be feminine. Due to the potential difficulty of these questions, we provided an example item first to get girls thinking about evaluative sources: "My parents would get upset if I didn't do well in school."

Diagnostic Analysis of Nonverbal Accuracy. Girls completed the Diagnostic Analysis of Nonverbal Accuracy (DANVA) to assess how skilled they were at identifying high- and low-intensity emotion expressions. In this task, participants were shown a series of 24 photographs of children with four different facial emotions (anger, happiness, sadness, and fear) and at two different intensities (high and low). As noted above, we were especially interested in performance on the low-intensity stimuli, and thus high- ($M = .83$, $SD = .13$) and low-intensity scores ($M = .73$, $SD = .14$) were calculated separately. The child's task was to correctly identify the emotion on the face from the four options listed above. This measure has demonstrated good reliability across a wide range of subjects between the age of 4 and 10 with high Cronbach's α (i.e., .88) and good test–retest reliability 4 weeks later (Nowicki & Duke, 1994).

Personal Beliefs About Gender.

Playmate Preferences. To measure girls' attitudes toward stereotypical and counterstereotypical children, we presented participants with eight written descriptions featuring stereotypical and counterstereotypical characters (i.e., two masculine girls, two feminine girls, two masculine boys, and two feminine boys). For example, "Betsy is 8. She likes to play football. How much do you think you would like her?" Participants rated those characters on the same 6-point visual scale used for video clips that ranged from 1 (*Really don't like*) to 6 (*Really like*). Girls evaluated scenarios involving girls and scenarios involving boys. Therefore, we calculated a stereotypical bias score for ratings of girl and boy targets by subtracting attitudes toward gender-counterstereotypical targets from attitudes toward gender-stereotypical targets ($M = .34$, $SD = 2.84$). Positive values mean that girls preferred playmates who engaged in stereotypical activities, whereas negative values mean that girls preferred playmates who engaged in counterstereotypical activities.

Career Aspirations and Expectations. We were interested in children's gender roles regarding careers. In two sets of questions, children were asked about their own aspirations to pursue several

careers and their gendered expectations for those careers. The full list included 43 adult occupations and activities (e.g., teaching a class, being a ballerina) and was pretested among children and adults (Shepard & Hess, 1975). We used the list to gauge children's gender-stereotypical beliefs about who should do each task and children's own aspirations, though we only selected a subset of items that were highly gendered (i.e., more than 70% of respondents indicated that the career was appropriate for one gender but not another) and that continue to be relevant (the pretest was conducted in the 1970s). Items included four careers: be a doctor, be president, be a ballet dancer, and be a nurse. In one task, children were asked whether they would like to do any of these careers when they grew up with the scale response options *Yes*, *No*, or *Maybe*. We calculated a *stereotypical aspirations score* by first summing the number of masculine items on which each girl said *No* with the number of feminine items on which each girl said *Yes*. Similarly, we summed the number of masculine items on which each girl said *Yes* with the number of feminine items on which each girl said *No*. We then subtracted the second sum from the first to arrive at the aspirations score ($M = -.21$, $SD = .70$), with higher scores meaning that girls aspired to more gender-stereotypical than counterstereotypical careers. *Maybe* responses were coded as 0 and had no impact on the stereotypical aspirations score.

In a second task, children were asked who should complete these four careers (be a doctor, be president, be a ballet dancer, and be a nurse) with the scale response options *Man*, *Woman*, or *Either*. We calculated a *stereotypical expectations score* by first summing the number of feminine items on which the child said *Woman* with the number of masculine items on which the child said *Man*. Similarly, we summed the number of feminine items on which each girl said *Man* with the number of masculine items on which each girl said *Woman*. We then subtracted the second sum from the first to arrive at the expectations score ($M = 1.31$, $SD = 1.14$), with higher scores meaning that the girls prescribed more gender-stereotypical careers to women and men. *Either* responses were coded as 0 and had no impact on the stereotypical expectations score.

Gender-Role Behavior.

Toy Play. In this task, children were provided with an array of 10 toys that ranged from traditionally feminine (e.g., tiara) to traditionally masculine (e.g., truck). These toys had been prerated as feminine or masculine (Blakemore & Centers, 2005). The child's choices and behavior during this time period were videotaped. We included this measure both to provide the child with a 5-min break between the first and second round of clip viewing and to assess play behavior. We calculated a stereotypical-bias score by subtracting how long (in seconds) each girl spent playing with masculine toys from the time she spent playing with feminine toys ($M = 14.15$, $SD = 166.06$).

Puppet Customization. In this task, girls named and dressed up[8] two puppets—a girl and a boy. They were instructed to choose professions for the puppets from a list of six that had previously been rated on femininity/masculinity (Shepard & Hess, 1975). The traditionally feminine professions were being a nurse, ballet dancer, or cheerleader. The traditionally masculine professions were being a firefighter, doctor, or mail delivery person. We

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[8] We had also intended to code how stereotypically children dressed the puppets, but the felt puppets were hard for children to keep the clothing affixed to, rendering this outcome measure unreliable across participants.

categorically coded whether girls assigned a traditionally stereo-typical or counterstereotypical profession to each puppet and assigned a 1 if the child assigned both puppets stereotypical jobs and a 0 if the child assigned either puppet a counterster-eotypical job ($M = .79$, $SD = .41$).

Toy Selection. At the end of their session, children got to select a toy to take home with them. They had the choice of eight toys that had previously been rated for femininity/masculinity (Blakemore & Centers, 2005). We selected two highly feminine toys (Barbie, My Little Pony), two moderately feminine toys (Beanie Baby, horse figurine), two moderately masculine toys (bug catching kit, Poké-mon card sets), and two highly masculine toys (Spiderman figurine, matchbox car set). All toys were matched on price such that they were at least $5 and less than $10. We coded the toys according to their stereotypicality such that selecting a highly feminine toy was coded as 2 and selecting a highly masculine toy was coded as -2 ($M = 1.21$, $SD = 1.03$).

Procedure

Parents were asked to bring their children to the lab for a series of tasks. The entire procedure was described in recruitment as taking 2 hr but across participants, the experiment typically took about 90 min. The experimenter working with the child was blind to the condition. A second experimenter was responsible for setting up all experimental materials in the testing room. All condition and counterbalancing assignments were determined ahead of time by the first and second authors to ensure similar numbers of children in each condition. In total, there were three experimenters trained to work with the child during the study (all women of college age); each experimenter ran between 20% and 43% of participants. There were seven experimenter assistants trained to set up the materials and work with the parents (all women of college age); each of these assistants set up between 2% and 32% of sessions. Parental consent was obtained after the study was described, any questions were answered, and parent and child were reminded that participation could be ended at any time without loss of benefit. Child participants first viewed a series of brief (about 10-s) TV clips according to their randomly assigned condition. The experimenter sat behind the computer screen while the child watched the clips so that she remained blind to the condition. To support the cover story and maintain girls' attention, each participant rated each of the 24 clips on how much she liked it using a 6-point visual scale (i.e., accompanied with frowning and smiling faces) that ranged from 1 (*Really don't like*) to 6 (*Really like*; $M = 4.17$, $SD = .84$).[9] Children were first trained on the use of these scales by being given sample items such as how much they like ice cream or swimming. After the children viewed all clips, they completed the measures described above and in the online supplement in a set order: playmate preference, toy play, puppet customization, career aspirations, felt pressure, career expecta-tions, DANVA, and toy selection.[10] Children received a sticker after completing each measure. Prior to customizing their puppets, the girls watched a second round of clips to ensure that the manipulation was viewed recently. At the end of the protocol, parents were then debriefed about the purpose of the study, children were given their chosen toy, and an experimenter escorted both parent and child out of the building.

Results

Did Exposure to Nonverbal Bias Influence Girls' Intersubjective Norms?

Our hypothesis was that observing a cultural pattern of nonverbal gender-role bias would cause children to believe that *others* favor gender-stereotypical children, but only among participants with advanced emotion perception abilities. There were no main or inter-active effects involving target gender (i.e., whether girls watched clips with girl targets or boy targets), $F < .39$, $p > .535$, so we collapsed across this factor in reported analyses. Please see Supplemental Online Materials for analyses that include this factor (Table S3). To test our primary hypothesis, we used the PROCESS macro (Hayes, 2012, 2013) to regress children's intersubjective norms onto an effects-coded condition variable (1 = Traditional, -1 = Reverse), a mean-centered DANVA score, and the interaction between the two.

There was no main effect of emotional perceptivity, $b = -.72$, $SE = .51$, $F(1, 64) = 2.01$, $p = .162$, $d = .36$, but there was a main effect of condition, $b = -.81$, $SE = .37$, $F(1, 64) = 4.62$, $p = .035$, $d = .54$. Furthermore, this main effect was qualified by a significant interaction. As predicted, we observed a significant interaction between bias condition and emotional perceptivity on girls' felt pressure to conform to traditional gender roles, $b = -1.13$, $SE = .51$, $F(1, 64) = 5.01$, $p = .029$, $d = .56$ (see Figure 3). However, simple effects tests were not significant. Among girls who were skilled at reading nonverbal emotion, those who watched Traditional clips felt nonsignificantly more pressure to be feminine than did those who watched Reverse clips, $b = .18$, $SE = .10$, $t(64) = 1.79$, $p = .078$, $d = .45$. Among girls who were not skilled at reading nonverbal emotion (i.e., 1 SD below the mean), clip condition did not differen-tially affect pressure to be feminine $b = -.14$, $SE = .10$, $t(64) = -1.41$, $p = .164$, $d = .35$.

Did Exposure to Nonverbal Bias Influence Girls' Personal Beliefs?

Next, we assessed whether nonverbal bias influenced girls' personal beliefs as moderated by emotional perceptivity. Bias condition did not influence private endorsement of gender roles, whether measured by playmate preferences, gender-stereotypical career aspirations, or gender-stereotypical career expectations.

Playmate Preferences. There was no main effect of emotional perceptivity, $b = 1.27$, $SE = 2.52$, $F(1, 64) = .26$, $p = .615$, $d = .13$, or main effect of condition, $b = -.23$, $SE = 1.86$, $F(1, 64) = .01$, $p = .903$, $d = .03$. We also observed no interaction between bias condition and emotional perceptivity on girls' preferences for stereotypical playmates, $b = .68$, $SE = 2.52$, $F(1, 64) = .07$, $p = .789$, $d = .07$.

Career Aspirations. There was a main effect of emotional perceptivity on career aspirations, $b = -1.34$, $SE = .60$, $F(1, 64) = 4.97$, $p = .029$, $d = .56$, such that more emotionally perceptive girls had more gender-stereotypical career aspirations. However, there

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[9] The experimental condition did not significantly predict liking ratings, $b = -.19$, $SE = .20$, $t(66) = -.91$, $p = .369$.
[10] We had also included an exploratory measure of intersubjective norms immediately after clip viewing. The measure was a new measure generated in lab that was initially included as a means for developing a new index of intersubjective gender norms in children (as part of an undergraduate thesis). However, we dropped it from analyses because it yielded negative internal reliability.

Figure 3
Example Clips From the Traditional Condition (Left Panel) and Reverse Condition (Right Panel)
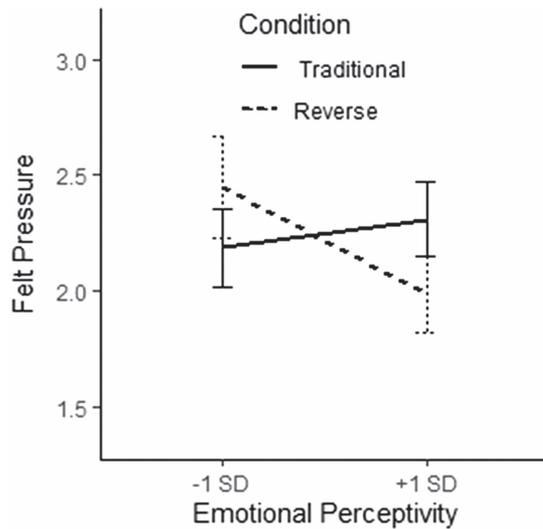
Note. In the Traditional condition, clips featured stereotypical characters being treated positively and counterstereotypical characters being treated negatively. In the Reverse condition, clips featured counterstereotypical characters being treated positively and stereotypical characters being treated negatively. Positivity was rated on a scale from 1 to 7. Ratings of expresser positivity ranged from 1.50 to 6.37.

was no main effect of condition, $b = -.02$, $SE = .44$, $F(1, 64) = .001$, $p = .968$, $d = .01$, or interaction between bias condition and emotional perceptivity, $b = .07$, $SE = .60$, $F(1, 64) = .01$, $p = .914$, $d = .003$.

Career Expectations. There was no main effect of emotional perceptivity, $b = -.17$, $SE = 1.01$, $F(1, 64) = .03$, $p = .869$, $d = .04$, or main effect of condition on girls' gender-stereotypical career expectations, $b = .17$, $SE = .75$, $F(1, 64) = .05$, $p = .821$, $d = .06$. We also observed no interaction between bias condition and emotional perceptivity, $b = -.37$, $SE = 1.01$, $F(1, 64) = .13$, $p = .715$, $d = .09$.

Did Exposure to Nonverbal Bias Influence Girls' Gender-Role Behavior?

Next, we assessed whether girls changed their own behavior as a function of the condition they saw and their emotional perceptivity. Bias condition did not influence gendered behavior, whether measured by toy play, toy selection, or puppet customization.

Toy Play. Regarding play with traditionally feminine (vs. masculine) toys, there was no main effect of emotional perceptivity, $b = -110.20$, $SE = 144.82$, $F(1, 64) = .58$, $p = .450$, $d = .19$, or main effect of condition, $b = 86.75$, $SE = 107.22$, $F(1, 64) = .65$, $p = .422$, $d = .20$. Further, we observed no interaction between bias condition and emotional perceptivity on girls' tendency to play with stereotypical (vs. counterstereotypical) toys, $b = -146.68$, $SE = 144.82$, $F(1, 64) = 1.03$, $p = .315$, $d = .25$.

Toy Selection. Regarding stereotypical toy selection, there was no main effect of emotional perceptivity, $b = .40$, $SE = .91$, $F(1, 64) = .19$, $p = .663$, $d = .11$, or main effect of condition, $b = -.28$, $SE = .67$, $F(1, 64) = .18$, $p = .676$, $d = .10$. Nor did we observe an interaction of emotional perceptivity and condition on girls' tendency to select a traditionally feminine (vs. masculine) toy to take home with them, $b = .58$, $SE = .91$, $F(1, 64) = .41$, $p = .523$, $d = .16$.

Puppet Customization. Regarding selecting stereotypical jobs for their girl and boy puppets, there was no main effect of emotional perceptivity, $b = .33$, $SE = 2.12$, $z = .16$, $p = .875$, $d = .02$, or main effect of condition, $b = -.71$, $SE = 1.56$, $z = -.45$, $p = .651$, $d = .05$. Nor was there an interaction of emotional perceptivity and condition on girls' tendency to select stereotypical careers for their puppets, $b = 1.22$, $SE = 2.12$, $z = .58$, $p = .565$, $d = .07$.

Did Intersubjective Norms Predict Gender-Role Behavior Better Than Personal Beliefs?

We then tested whether intersubjective norms or personal beliefs better predicted gender-role behavior. First, we regressed each behavioral outcome (toy play, puppet customization, toy selection) on intersubjective norms. Intersubjective norms predicted toy play, $b = 84.62$, $SE = 32.85$, $t(66) = 2.58$, $p = .012$, $d = .64$, and puppet customization, $b = 1.79$, $SE = .69$, Wald's $\chi^2(1) = 6.63$, $p = .010$, $d = .66$, but not toy selection, $b = .39$, $SE = .21$, $t(66) = 1.88$, $p = .065$, $d = .46$. In each case, the more that girls believed that their parents and peers preferred traditional gender-role behavior, the more that they behaved in a gender-stereotypical manner. Then, we regressed each behavioral outcome onto personal beliefs. In contrast to effects of intersubjective norms, personal beliefs did not predict toy play, $F(3, 64) = 1.45$, $p = .237$, partial $\eta^2 = .06$, puppet customization, $\chi^2(3) = 6.32$, $p = .097$, Cramer's $V = .18$, or toy selection, $F(3, 64) = .09$, $p = .967$, partial $\eta^2 = .004$.

Yet, we were especially interested in which predicted gender-role behavior better: intersubjective norms or personal beliefs. The best way to test this is to include both predictors in the model simultaneously. Thus, we then predicted each behavioral outcome using *both* personal beliefs and intersubjective norms. These analyses enabled us to examine if intersubjective norms predicted behavior independent of variance accounted for by personal beliefs. In this model, intersubjective norms continued to predict stereotypical toy play, $b = 73.09$, $SE = 35.36$, $t(63) = 2.07$, $p = .043$, $d = .52$, and puppet customization, $b = 2.19$, $SE = .80$, Wald's $\chi^2(1) = 7.42$, $p = .006$, $d = .70$. Furthermore, girls' intersubjective norms now significantly predicted stereotypical toy selection, too, $b = .49$, $SE = .23$, $t(63) = 2.15$, $p = .036$, $d = .54$. In contrast, personal beliefs did *not* significantly predict any behavioral outcome: toy play, $R^2\Delta = .03$, $F(3, 63) = .78$, $p = .521$, puppet customization (playmate preferences: $\chi^2(1) = 1.61$, $p = .205$, Cramer's $V = .15$; stereotypical aspirations: $\chi^2(1) = 1.63$, $p = .201$, Cramer's $V = .15$; stereotypical expectations: $\chi^2(1) = 2.61$, $p = .106$, Cramer's $V = .20$), or toy selection, $R^2\Delta = .02$, $F(3, 63) = .48$, $p = .696$.

Discussion

Exposure to nonverbal gender-role bias influenced emotionally perceptive girls' intersubjective gender norms, consistent with our main hypothesis. Girls who observed nonverbal bias favoring traditional (vs. reverse) gender roles were more likely to attribute traditional gender-role values to others (i.e., their parents and peers), but as predicted, these effects were specific to girls with advanced abilities in reading nonverbal emotion. In contrast, exposure to

nonverbal gender-role bias did not influence girls' private endorsement of gender roles or their gender-role behavior.

We also found support for our hypothesis that intersubjective norms would predict gender-role behavior: to the extent that girls thought that others valued traditional gender roles, they spent more time playing with feminine than masculine toys and were more likely to select stereotypical careers for the girl and boy puppets they designed. Indeed, intersubjective gender norms were the only significant predictor of gender-role behavior—personal endorsement of gender roles had a weaker and nonsignificant relationship with such behavior.

The absence of a (total) effect of nonverbal bias on girls' gender-role behavior prevented us from using traditional approaches to statistical mediation through intersubjective norms. However, there remains debate on whether a total effect is necessary for examining indirect effects (Kenny & Judd, 2014; MacKinnon & Pirlott, 2015; Rucker et al., 2011). Accordingly, we report moderated indirect effect analyses in the Supplemental Online Materials. As described there, we observed a moderated indirect effect of nonverbal bias on gender-role behavior (through intersubjective norms). However, because scientists differ in their views on how best to interpret indirect effects in the absence of total effects (Kenny & Judd, 2014; Rucker et al., 2011), we focus our conclusions on the simpler correlational analyses reported in the main text.

We thus concluded that girls' intersubjective norms were influenced by their exposure to nonverbal bias and that girls' intersubjective norms predicted their subsequent gender-role behavior. Together, these two effects suggest that changes to intersubjective norms (caused by exposure to nonverbal bias) *may* eventually translate to changes in girls' gender-role behavior. Yet more research is needed to confirm this mechanism. Overall, the findings of Study 2 are consistent with prior work in which the effects of cultural patterns have strong and direct effects on intersubjective norms and weaker or indirect effects on personally endorsed beliefs (e.g., endorsement of collectivism; Chiu et al., 2010; Tam et al., 2012; Weisbuch & Ambady, 2009). Moreover, the findings of Study 2 suggest that intersubjective norms have an important but understudied impact on children's gender-role behavior.

Two nuances are worth highlighting in the Study 2 data. First, significant effects of intersubjective norms on gender-role behavior were observed for toy play and puppet customization, but similar effects on toy selection were not significant. When covarying out variance associated with personal beliefs, all three effects on behavior were significant. We regarded the use of several behavioral outcomes as a strength in this study design, and we believe that the converging pattern of results supports the view that intersubjective norms uniquely predicted girls' gender-role behavior. Nonetheless, these effects were not large, so we introduced another measure of gender-role behavior in Study 3. Second, we observed a significant interaction of condition and emotional perceptivity on intersubjective norms, but a nonsignificant simple effect of condition on intersubjective norms for girls 1 SD above the mean on emotional perceptivity. While the effect size was reasonable (i.e., $d = .45$), we wanted to test in Study 3 if this simple effect was significant in a larger sample.

Study 3

We had several goals for Study 3. First, we examined whether the effects of nonverbal bias on intersubjective norms were replicable.

Second, as noted above, we used a different measure of behavior. Specifically, we examined girls' *expressive* behavior: their nonverbal and verbal behavior in a video they ostensibly created for same-gender peers to evaluate. This behavioral task provided a means to (a) examine the conceptual replicability of the effects of intersubjective norms on girls' behavior and (b) examine whether these effects extend to more public behavior. That is, the behavioral measure in Study 2 focused on children's behavioral choices when they were alone or with an experimenter (e.g., which toys to play with when playing solo). This behavior was private in the sense that participants assumed they would not be observed by peers. Although traditional gender roles surely manifest in private behaviors, the impact of intersubjective norms may be greater when manifesting in public (Crandall et al., 2002; LaCosse et al., 2016; Mallett et al., 2019; Woodzicka & LaFrance, 2005). Indeed, research on intersubjective norms and even social referencing suggests that the impact of perceived norms is particularly impactful when people feel accountable to an ingroup audience (Chiu et al., 2010; Gelfand & Realo, 1999; Leung & Morris, 2015; Repacholi & Meltzoff, 2007), such as when anticipating evaluation by the ingroup (e.g., girls of the same age). We hypothesized that when girls anticipate evaluation by peers, their nonverbal and verbal expressions are likely to reflect intersubjective norms of femininity, which themselves reflect cultural patterns of nonverbal bias. We tested this hypothesis in Study 3 by examining nonverbal and verbal expressions of high warmth and low competence, both of which are associated with the feminine gender role (Eckes, 2002; Fiske et al., 2002; Kray et al., 2014). Ultimately, we expected that Traditional (vs. Reverse) bias would cause girls to feel greater pressure to be feminine, which would subsequently impact their nonverbal and verbal behaviors.

Finally, we limited the clips in Study 3 to be those with targets who were girls. We had observed no significant effects of target gender in Study 2, and by focusing on only girl targets in Study 3, we were able to remove a potential source of noise in the data and increase statistical power.

In summary, in Study 3, we used a two-level (Nonverbal Bias Condition) between-groups design, testing the moderating effects of emotion perception accuracy on the development of intersubjective norms and enactment of public, gender-stereotypical behavior. We expected to replicate the interaction of emotional perceptivity and nonverbal bias condition on intersubjective norms and to observe that intersubjective norms predicted girls' gender-role behavior more accurately than personal beliefs. This study—including its hypotheses, design, and analyses—was preregistered (https://osf.io/xjm59).

Method

Participants and Setting

We recruited 95 girls for this study to generate a sufficient sample size in each condition and to have enough variation in emotional perceptivity to test its impact as a moderator. We based this sample size estimate on the size of the interaction (Cohen's $f^2 = .08$) observed in Study 2 with the goal of achieving .80 power using G*Power (Faul et al., 2007). Therefore, our a priori recruitment goal was for a sample of 95 girls, with the expectation that we would stop data collection at the end of the academic quarter (see preregistration: https://osf.io/xjm59). We recruited 95 participants by the close of the

academic term with the intent of oversampling to account for heterogeneity of effect sizes and exclusions. However, following exclusions, our final sample consisted of 91 child participants, including 61 White, 2 Black, 4 Latina, and 22 multiracial participants ranging in age from 6 years, 3 months to 10 years, 5 months ($M = 8$ years, 1 month).[11]

Materials

Experimental Manipulation. We used the same manipulation as described in Study 2 with the exception that the Traditional and Reverse conditions only featured clips of girl targets.

Intersubjective Norms. To evaluate intersubjective norms, children completed the established measure of intersubjective norms (felt pressure) from Study 2 ($M = 2.01$, $SD = .58$; $\alpha = .71$).[12]

Gender-Role Behavior.

Introductory Video. Following established procedure (Pauker et al., 2022), children were asked to record three brief introductory videos to be evaluated by ostensible peers. To strengthen this manipulation, participants were told that their audience would be girls who were the same age or slightly older. Participants were also shown pictures of these girls. After viewing the pictures, participants were asked a series of questions to introduce themselves to the girls pictured. Specifically, girls were instructed to draw message prompts from each of three bowls with folded pieces of paper. Unbeknownst to the girls, all prompts within each bowl were the same and were written to get girls to talk about themselves and other girls. The first prompt read, "Imagine you are introducing yourself to these kids. What are three things you would tell them about yourself so that they could get to know you?" The second prompt read: "In what ways are you like most girls and in what ways are you different from most girls?" The third prompt read: "Tell these kids about one of your favorite cartoon characters. What makes that character special? How are you like the character you chose?" The experimenter read each prompt to the participant to confirm that she understood it. Participants were given up to 1 min to prepare for each recording. The prompt was available to the girl while recording each video.[13]

Audiovisual Coding. Children's videos were coded for nonverbal gender-stereotypicality and verbal/vocal gender-stereotypicality. Each child's full video response was separated into each of the three questions (response length: $M = 26$, $SD = 20$). Seventy-nine undergraduate students (65% women; 73% White) rated each video recording without sound (to index nonverbal behavior) and 55 undergraduate students (64% women; 76% White) rated each recording without video (i.e., heard only the audio; to index verbal and vocal behavior). We separated the recordings in this way to isolate nonverbal channels from verbal and vocal channels. These adult judges were randomly assigned to rate each child on competence (i.e., intelligent, smart, and capable) or on warmth (i.e., friendly, caring, and sociable) on a scale from 1 (*not at all*) to 7 (*extremely*).[14] Ratings for each response were aggregated across raters and then across prompts, yielding four measures per child: nonverbal-warmth, nonverbal-competence, verbal-warmth, and verbal-competence.

We focused specifically on competence and warmth because these characteristics are often regarded as two key dimensions of social evaluation, and because these characteristics often encompass the ways that people describe individuals and groups (Fiske et al., 2007; Judd et al., 2005). These two dimensions map onto traditional gender stereotypes such that femininity is characterized by higher

warmth and lower competence than is masculinity (Eckes, 2002; Fiske et al., 2002). Therefore, we measured these two dimensions of social perception with the hypothesis that Traditional (vs. Reverse) bias would cause emotionally perceptive girls to feel pressure to behave in feminine ways and subsequently behave in more feminine ways. However, we anticipated this effect may be stronger for competence than warmth. Recent research suggests that social expectations are more flexible in terms of whether girls and women express competence than whether they express warmth (Eagly et al., 2020; Rudman & Glick, 2001). Given that proscriptions about competence are more flexible and less strict, we reasoned that there may be more room for cultural patterns to influence girls' displays of competence.

Personal Beliefs.

Activities Preference Scale. Children's preferences for feminine and masculine activities were gauged with responses to the Activity Preference Scale (Martin & Dinella, 2012). This scale includes feminine, masculine, and neutral activities. Children indicated how much they like each activity with 0 (*not at all*), 1 (*a little*), or 2 (*a lot*). We selected a subset of items from this established scale. Specifically, we selected three traditionally feminine activities (i.e., dressing up, playing with dolls, and playing jump rope) and three traditionally masculine activities (i.e., climbing trees, playing football, and skateboarding). After recording their video messages, children were asked to indicate their preferences for each of these items. Importantly, participants were told that their answers would be sent along with the videos they recorded so that the other girls could get to know them better. In other words, girls knew that their responses would be evaluated by peers. We calculated a scale score as the difference between the averages of the feminine and masculine activities with higher values meaning stereotypical activity preferences (i.e., preferences for feminine activities; $M = .38$, $SD = .65$). Similar versions of this scale have been used previously and have predictive validity (Martin & Dinella, 2012).

Emotional Perceptivity. To confirm the similarity between adult and child ratings of the clips, girls also rated a subset of the clips from Study 1.[15] They then completed the DANVA (Nowicki & Duke, 1994) as the last task in this study.

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[11] Four participants were excluded because they did not complete the study ($n = 1$) or because of computer errors ($n = 3$). One parent of an additional participant refrained from identifying their child's race, but this child's data were still included in analyses.

[12] To improve reliability, clarity, and readability of the felt pressure for conformity measure in this study, we also adjusted wording from first person to second person since the experimenter read the item out loud to the child. For example, "My parents wouldn't like it if I wanted to learn an activity that only boys do" was updated to "Your parents wouldn't like it if you wanted to learn an activity that only boys do."

[13] Following the videos, a subset of children reported reflected appraisals on how much they thought the girls watching their video and girls in general would want to be their friend and would like them. See Supplemental Online Materials for analyses on this outcome.

[14] Adjective descriptors of competence and warmth were based on those used by Judd et al. (2005).

[15] To confirm consistency between the perception of emotion by adult and child raters of this manipulation, we had Study 3 child participants rate the expresser versions of each of the clips used in one of the experimental conditions. For each clip, girls evaluated how much the expressers liked the hidden character. Children completed these ratings at the end of their experimental session using the same 6-point scale used in other tasks throughout their session from 1 (*Really Don't Like*) to 6 (*Really Like*).

Procedure

Like Study 2, parents were asked to bring their children to the lab for a series of tasks. The entire procedure was shorter and took about 60 min. The process of random assignment, counterbalancing, and experimenter-blinding was the same. In total, there were six experimenters trained to work with the child during the study (all women of college age); each experimenter ran between 1% and 36% of participants. There were 10 experimenter assistants trained to set up the materials and work with the parents (women, men, and nonbinary persons of varying age); each of these assistants set up between 2% and 25% of sessions. Parental consent was obtained after the study had been described, any questions had been answered, and parents and children were reminded that participation could be ended at any time without loss of benefit. After a 5-min play warm-up, child participants were assented and began watching the television clips. After the children viewed all clips, they completed the video interaction task, the Activity Preference Scale, the felt pressure measure, the emotion ratings of the Study 1 clips, and the DANVA.[16] The child was then invited to pick out a toy to thank them for participation. Toys were not programmatically selected for gender stereotypicality, and thus in contrast to Study 2, the toy each child selected was not a dependent variable in this study. Parents and children were then debriefed about the purpose of the study.

Results

Did Exposure to Nonverbal Bias Influence Girls' Intersubjective Norms?

As in Study 2, our hypothesis was that observing a cultural pattern of nonverbal gender-role bias would cause children to believe that *others* favor gender-stereotypical children, but only among child participants with advanced emotion perception abilities. To test this, we regressed felt pressure onto nonverbal bias condition, emotional perceptivity, and their interaction. There was a main effect of emotional perceptivity, $b = -1.02$, $SE = .41$, $F(1, 87) = 6.30$, $p = .014$, $d = .54$, and a main effect of condition, $b = -.66$, $SE = .29$, $F(1, 87) = 4.97$, $p = .028$, $d = .48$. However, these main effects were qualified by a significant interaction, $b = .98$, $SE = .41$, $F(1, 87) = 5.78$, $p = .018$, $d = .52$. Replicating the pattern in Study 2, among girls who were skilled at reading nonverbal emotion, those who watched Traditional clips thought their parents and peers valued traditional gender roles significantly more than girls who watched Reverse clips, $b = .18$, $SE = .08$, $t(87) = 2.15$, $p = .034$, $d = .46$. Among girls who were not skilled at reading nonverbal emotion, clip condition did not significantly influence girls' beliefs about their parents and peers valuing traditional gender roles, $b = -.10$, $SE = .08$, $t(87) = -1.26$, $p = .212$, $d = .27$.

Did Exposure to Nonverbal Bias Influence Girls' Personal Beliefs?

Next, we assessed whether nonverbal bias influenced girls' personal beliefs as moderated by emotional perceptivity. Bias condition did not influence private endorsement of gender roles, as measured by activity preferences. That is, we observed no interaction between bias condition and emotional perceptivity on girls' stated preferences to engage in stereotypical activities, $b = .13$,

$SE = .48$, $F(1, 87) = .08$, $p = .783$, $d = .06$. Nor did we observe a main effect of emotional perceptivity, $b = .35$, $SE = .48$, $F(1, 87) = .55$, $p = .465$, $d = .16$, or bias condition, $b = -.18$, $SE = .34$, $F(1, 87) = .27$, $p = .606$, $d = .11$.

Did Exposure to Nonverbal Bias Influence Girls' Gendered Behavior?

Next, we assessed whether nonverbal bias influenced how girls who were emotionally perceptive behaved after the manipulation. Bias condition did not influence gendered behavior, as measured by warmth and competence in girls' nonverbal and verbal channels.

Competence. Emotional perceptivity predicted nonverbal, $b = 1.77$, $SE = .47$, $F(1, 87) = 14.36$, $p < .001$, $d = .81$, and verbal competence, $b = 1.33$, $SE = .53$, $F(1, 87) = 6.35$, $p = .013$, $d = .54$, such that emotionally perceptive (vs. imperceptive) girls conveyed more competence by way of their nonverbal and verbal behavior. However, the condition had no effect on nonverbal, $b = .24$, $SE = .34$, $F(1, 87) = .50$, $p = .482$, $d = .15$, or verbal competence, $b = -.10$, $SE = .38$, $F(1, 87) = .07$, $p = .796$, $d = .06$. Nor did we observe an *interaction* between bias condition and emotional perceptivity on girls' nonverbal, $b = -.36$, $SE = .47$, $F(1, 87) = -.77$, $p = .441$, $d = .19$, or verbal competence, $b = .04$, $SE = .53$, $F(1, 87) = .01$, $p = .945$, $d = .02$.

Warmth. With regard to warmth, there was no main effect of emotional perceptivity, $b = .59$, $SE = .70$, $F(1, 87) = .70$, $p = .404$, $d = .18$, main effect of bias condition, $b = -.20$, $SE = .51$, $F(1, 87) = .15$, $p = .698$, $d = .08$, or interactive effect of emotional perceptivity and bias condition on nonverbal warmth, $b = .21$, $SE = .70$, $F(1, 87) = .09$, $p = .762$, $d = .06$. Similarly, there was no main effect of emotional perceptivity, $b = .16$, $SE = .46$, $F(1, 87) = .13$, $p = .724$, $d = .08$, main effect of bias condition, $b = -.06$, $SE = .33$, $F(1, 87) = .03$, $p = .865$, $d = .04$, or interactive effect of emotional perceptivity and bias condition on verbal warmth, $b = -.13$, $SE = .46$, $F(1, 87) = .08$, $p = .784$, $d = .06$.

Did Intersubjective Norms Predict Gender-Role Behavior Better Than Personal Beliefs?

We then tested whether intersubjective norms or personal beliefs better predicted gender-role behavior. First, we regressed each behavioral outcome (nonverbal and verbal competence and warmth) on intersubjective norms. Intersubjective norms predicted nonverbal, $b = -.34$, $SE = .12$, $t(89) = -2.90$, $p = .005$, $d = .61$ and verbal competence, $b = -.28$, $SE = .13$, $t(89) = -2.16$, $p = .033$, $d = .46$, but not nonverbal, $b = .03$, $SE = .17$, $t(89) = .16$, $p = .871$, $d = .03$, or verbal warmth, $b = -.02$, $SE = .11$, $t(89) = -.21$, $p = .832$, $d = .04$. Then, we regressed each behavioral outcome on personal beliefs. Personal beliefs did not predict any behavioral outcome: nonverbal competence: $b = .05$, $SE = .11$, $t(89) = .49$, $p = .628$, $d = .10$; verbal competence: $b = -.09$, $SE = .12$, $t(89) = -.72$, $p = .474$, $d = .15$; nonverbal warmth: $b = .24$, $SE = .15$, $t(89) = 1.60$, $p = .114$, $d = .34$, or verbal warmth: $b = .001$, $SE = .10$, $t(89) = .01$, $p = .990$, $d = .002$.

Yet we were especially interested in which predicted gender-role behavior better: intersubjective norms or personal beliefs. As in our

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[16] Children also completed a few exploratory measures: popularity and approval (an exploratory measure of intersubjective norms we created in lab), fear of negative social evaluation, and gender role-flexibility.

analyses of Study 2 data, the best way to test this is to include both predictors in the model simultaneously. Thus, we then included *both* personal beliefs and intersubjective norms in the models simultaneously to see if intersubjective norms continued to predict behavior independent of variance accounted for by personal beliefs. In this model, intersubjective norms continued to predict competence in verbal, $b = -.27$, $SE = .13$, $t(88) = -2.05$, $p = .043$, $d = .44$, and nonverbal channels, $b = -.37$, $SE = .12$, $t(88) = -3.05$, $p = .003$, $d = .65$. Personal beliefs did not: verbal, $b = -.04$, $SE = .12$, $t(88) = -.34$, $p = .735$, $d = .07$; nonverbal, $b = .12$, $SE = .11$, $t(88) = 1.06$, $p = .291$, $d = .23$. As before, intersubjective norms did not predict warmth in verbal, $b = -.03$, $SE = .12$, $t(88) = -.22$, $p = .828$, $d = .05$, or nonverbal channels, $b = -.02$, $SE = .17$, $t(88) = -.13$, $p = .896$, $d = .03$. Neither did personal beliefs: verbal, $b = .01$, $SE = .11$, $t(88) = .05$, $p = .958$, $d = .01$, and nonverbal, $b = .25$, $SE = .16$, $t(88) = 1.59$, $p = .116$, $d = .34$. Again, the absence of total effects on gendered behavior prevented us from conducting a traditional mediation analysis. We include an alternative approach to mediation (i.e., indirect effects) in the Supplemental Online Materials.

Discussion

Replicating Study 2, exposure to a cultural pattern of nonverbal bias influenced girls' intersubjective norms. Girls who observed nonverbal bias favoring traditional (vs. reversed) gender roles were more likely to attribute traditional gender-role values to others (their parents and peers), and as in Study 2, these effects were specific to girls with advanced abilities in reading nonverbal emotion. Here, the simple effect of condition on intersubjective norms for these girls with advanced emotional perceptivity was significant with a medium-sized effect. Moreover, girls' intersubjective norms were predictive of their subsequent gender-role behavior: to the extent girls attributed traditional gender-role beliefs to others, they expressed less competence in their nonverbal and verbal behavior.

We observed no such effects on girls' warmth, suggesting that the relationship between intersubjective norms and gender-role behavior may be limited to competent behaviors. Notably, these findings are consistent with prior research suggesting that a person's expressions of gender roles can have a greater impact on observers' evaluations of competence than warmth. For example, one set of studies found that perceived competence—but *not* perceived warmth—varied as a function of vocal femininity (Ko et al., 2009). Job applicants with masculine voices were evaluated as more competent, but not less warm, than those with feminine voices. Relatedly, other work has replicated this effect of vocal pitch on perceived competence and even observed reverse effects on perceived warmth such that low vocal pitch led to higher warmth ratings (Zoghaib, 2019). Nonetheless, the absence of effects for girls' warmth behaviors in the present study was not predicted and therefore awaits replication.

In summary, 3 min of silent television show clips were sufficient to shift girls' intersubjective norms. Moreover, it is worth noting that the behavioral effects observed here were not limited to private behaviors—intersubjective norms were associated with girls' expressions of competence in a video made for peers. Notably, we isolated a cultural pattern of traditional nonverbal gender-role bias as the cause of such rapid shifts in girls' intersubjective norms. This study thus supports theories that suggest that intersubjective norms are a result of cultural influence and that intersubjective norms predict behavior better than do personal beliefs (Kwan et al., 2015).

More broadly, the nature of the experimental manipulation lends itself well to intervention—children simply watched TV clips, which is an activity that most children enjoy, and such viewing influenced their knowledge of gender roles (i.e., intersubjective gender norms). Although much more translational research is necessary before implementing such interventions, the results from Studies 2 and 3 suggest that such an intervention holds promise if implemented on a longer timescale (e.g., watch 10 min of clips or more each day).

General Discussion

Three studies supported our hypotheses that (a) a meaningful pattern of gendered nonverbal bias exists in children's television shows, (b) exposure to this cultural pattern causes girls to believe that others value traditional gender roles (i.e., exposure to nonverbal bias influenced girls' intersubjective norms), (c) this influence of nonverbal bias was limited to girls who possessed the social-cognitive capacity to accurately read subtle emotion expressions, and (d) girls' intersubjective norms—but not their private endorsement of gender roles—were associated with their own gender-role behavior. Findings from this research thus contribute to the scientific understanding of the relationship between intersubjective norms and gender roles, including the causes and consequences of intersubjective gender norms. Ultimately, these studies point to new insights about gender-role socialization in middle childhood.

Theoretical and Methodological Implications

The current studies have important implications for theorizing in social and developmental psychologies, as well as implications for how scientists test those theories. These implications span multiple domains of scientific inquiry.

Development of Gender Roles

A rich scientific literature describes the emergence of gender differences during childhood, with many scholars concluding that gender differences are shaped by both biology and culture (Confer et al., 2010; Eagly, 1997; Eagly & Wood, 1982, 2013; Finkel & Eastwick, 2009; Lickliter & Honeycutt, 2003; Pedersen et al., 2011; Van Anders et al., 2011). Among the cultural factors that impact gender differences, many theories describe how children develop beliefs and behaviors that are consistent with traditional gender roles (Bigler & Liben, 2007; Bussey & Bandura, 1984; Kohlberg, 1966; Martin & Halverson, 1981; Mischel, 1966). We identified uncharted territory in this literature and began to explore it in three studies. First, knowledge—as opposed to an endorsement—of gender roles is likely to be a key factor in how gender roles influence behavior. We conceptualized such knowledge as intersubjective gender norms—beliefs about the degree to which others value feminine versus masculine girls and boys. Accordingly, we identified one cause of children's intersubjective gender norms: exposure to nonverbal bias. Additionally, we observed that intersubjective gender norms are a unique antecedent of girls' behavior, above and beyond any effect of personal beliefs.

Second, to the degree that children learn about gender roles from the social environment, it seemed critical to identify the observable—and naturally occurring—behaviors that "teach" children about the

content of gender roles. Content analyses often examine the first part of this process, but typically stop once a pattern of public representations is identified and do not examine if or how those public representations shape individuals' private representations (Anderson & Hamilton, 2005; Smith & Granados, 2009). On the other hand, tests of Social Cognitive Theory and Social Learning Theory have typically generated behavioral patterns to test in the lab such as marching around a table or wearing a hat of a particular color to observe whether children emulate behaviors performed by gender-matched models (Bussey & Bandura, 1984). Yet, these patterns are speculative (with respect to whether children actually encounter them outside the lab). We observed a cultural pattern of nonverbal bias that, in principle, could teach children that people expect different behaviors from girls and boys. Specifically, TV characters displayed more positive nonverbal responses to gender-stereotypical than counterstereotypical individuals. Importantly, this pattern was observed across 12 children's television programs, suggesting that U.S. children's social environments (at least to the extent they watch TV) are saturated with this pattern.

Given that this pattern was observed across different kinds of shows (e.g., animated, not animated, shows featured on Cartoon Network, shows featured on cable), nonverbal gender-role bias may also be observed in other dynamic media, such as movies or video games, and even in static media, such as books or magazines. Past content analyses indicate that these other kinds of media feature gender similarly as television does (Smith & Granados, 2009). However, we cannot *assume* that nonverbal gender-role bias is present in other media—TV producers, for example, may curate what they present to the world in a different way than do YouTube or TikTok users, and such differences could (in principle) lead to different gendered displays. Thus, content analyses of nonverbal gender-role bias in social media, web pages, and periodicals are an important area for future research. Beyond other forms of media, cultural patterns of nonverbal bias may also extend to the interactions children observe in their daily lives, though additional research is needed to test the generalizability of this nonverbal bias to other settings. In this research, we also circumscribed our sampling to show that children in the U.S. watch given that show popularity and availability varies by region, and this study sampled American children. However, it is possible that the cultural pattern of nonverbal bias we observed here extends to shows popular in other regions of the world given that gender inequality is observed broadly (Charlesworth & Banaji, 2021). Additional research should assess cross-cultural variation (and similarity) in patterns of nonverbal gender-role bias. Despite these limitations, we *do* present evidence here on a medium that is frequently encountered by children, so even if nonverbal gender-role bias is specific to children's television programming, it is likely to be repeatedly observed by those children.

Finally, whenever children encounter others in their local ecologies, they also simultaneously encounter a wealth of contextual cues and low-level visual cues. Amidst this dynamic complexity, children may not notice the subtle behaviors that suggest how girls and boys should act. Of course, it is possible that children attend to the cues scientists have hypothesized inform gender-role socialization, such as the toys that other girls and boys play with or the behaviors other girls and boys engage in that receive positive feedback. However, it is also possible that these cues yield effects in closely controlled laboratory settings, but not when these cues are situated in the context of other patterns and noise present in typical social

environments. In the current work, children were presented with a cultural pattern of nonverbal behavior embedded within "noisy" social contexts more typical of social life. We observed that girls altered their knowledge about gender roles (intersubjective gender norms) in response to this pattern of nonverbal bias.

Ultimately, by (a) characterizing a subtle and naturally occurring pattern of gender-biased behavior that children are likely to encounter frequently in their social environments and (b) examining if and how exposure to this pattern of behavior shapes intersubjective gender norms, the current studies contribute to theorizing on gender roles by examining how culturally shared knowledge of gender roles "gets into the heads" of children between the ages of 6–11.

Intersubjective Norms

Existing theories of intersubjective norms emphasize that the relationship norms and behavior are critical to examine (Chiu et al., 2010), in part because intersubjective norms may have downstream impacts on behavior (Zou et al., 2009). Yet, relatively little research has examined how widespread public representations might cause people to shift their beliefs about others' values and expectations. In the current studies, we examined the relationship between public and private representations of gender roles, thus testing a communicative pathway through which intersubjective norms may be culturally transmitted. Specifically, we examined how children's private representations of gender roles (i.e., intersubjective norms) are influenced by seeing public (nonverbal) representations of gender-role bias.

Moreover, this is some of the first evidence for the relationship between intersubjective norms and behavior in children. Previous work has quantified children's intersubjective norms. For example, by the age of 4, children who watch more television are more likely to believe that other people think boys are "better" than girls (Halim et al., 2013) and transgender and cisgender children alike say that other people hold stronger gender stereotypes than they do themselves (Rubin et al., 2019). However, to our knowledge, past work on gender norms in children has not linked these norms to *behavior*. In our work, we observed that stronger intersubjective norms, as indexed by the felt pressure for conformity measure, predicted more gender-stereotypical toy play choices, more gender-stereotypical puppet customization, and less expressed competence. Importantly, these behaviors were not as strongly predicted by girls' personal beliefs about gender. These findings thus provide foundational evidence for the importance of intersubjective norms to children's behavior, and we hope they provide a basis for future work that details the breadth of influence for intersubjective norms during childhood, and the cognitive processes through which such influence accrues.

Media Effects

Our approach in these studies may also contribute to the body of work on media effects. Recent work on media effects has led to some debate on when, how, and if television and other forms of media actually influence viewers' beliefs and behavior (Bushman & Anderson, 2021; Coyne et al., 2019; Ferguson, 2015; Ferguson et al., 2017). In our studies, we documented a roughly medium-sized effect of media on intersubjective norms, but not personal beliefs. Our approach differed from that of many media effects studies in that we used an experimental design, isolated a particular pattern of

nonverbal behavior distributed across children's television shows in the U.S., and measured both intersubjective norms and personal beliefs as outcomes. This approach diverges from most media effects studies, which often employ correlational designs, test how a general *type* of media (e.g., violent video games) impacts viewers, and focus on personal beliefs or behavior as the outcome. Therefore, our studies point to important considerations in future media effects work, such as specificity in manipulating exposure to media and including intersubjective norms measures as outcomes of media exposure. Of course, as detailed below, the studies presented here also include important limitations that are absent in other media effects studies.

Limitations

Effect Sizes

Many of the effect sizes we observed were small or medium in size. For example, the size of the nonverbal bias in Study 1 was significant but small. Similarly, exposure to this nonverbal bias had a medium-sized effect on girls' intersubjective norms, but no effect on girls' own beliefs or behavior. Therefore, observing nonverbal gender-role bias may only account for a small amount of variance in children's gender-role learning. On the other hand, even a small nonverbal bias (Study 1) may have a large impact on children as children encounter this bias over longer time spans. That is, in Studies 2 and 3, girls only saw about 3 min of television clips. Yet, even this brief viewing window was sufficient to change their intersubjective norms. This small effect may accumulate over longer time spans into a larger effect—after all, the average 8-year-old in the U.S. watches about 4 hr of television programming per day (Nielsen, 2015). Furthermore, nonverbal gender-role bias may not be limited to televised media. We focused on patterns of nonverbal bias on television because this medium is one that reaches a wide range of children on a regular basis. However, children may also observe nonverbal gender-role bias in classrooms, playgrounds, and everyday interactions. Whether nonverbal bias extends to other domains—and whether the effects of seeing nonverbal bias accumulate over time—is an important question for future study. Nonetheless, even subtle patterns of nonverbal bias may be important in the transmission of gender roles because nonverbal bias generally goes unnoticed, even among adults (Weisbuch et al., 2009). In contrast to other kinds of bias that could be more explicitly counterargued (i.e., hearing "Boys shouldn't cry"), nonverbal bias might impact perceived norms with less interference from observers' conscious processing.

Overall, the current studies provide proof of concept that nonverbal gender-role bias exists in children's television programming and influences girls' intersubjective norms. The size of the latter effect, the extent to which it accumulates over time, and the extent to which it operates outside of television remain unclear and remain limitations of the current work.

External Validity

The methodology employed here has several advantages over extant media effects methods (see above), but also has important limitations in external validity. Most media effects studies either query participants about their naturally occurring media usage or experimentally expose participants to entire TV episodes (or video games). Unlike the current studies, existing methods in media effects better approximate natural television viewing: a 10-s silent TV clip (as used in the current studies) limits perceivers' knowledge of the broader context in which nonverbal behavior occurs, whereas natural television viewing does not. Moreover, many parents engage with their children as they watch television shows (Valkenburg et al., 1999), and many media effects studies (including but not limited to the current studies) fail to account for how TV viewers communicate with each other during TV viewing. Accordingly, the degree to which televised nonverbal bias influences children's gender-role beliefs when they watch television in their own homes is unknown. Nonetheless, it is important to recall the strengths of our methodology against this background—we used a more representative sample of media than typically examined in experimental approaches to media effects (12 TV programs, multiple episodes from each) and did not "pick and choose" clips (or episodes) to code, but rather used a priori rules for selecting clips and episodes (thus limiting experimenter biases).

Second, it is possible that children were subject to demand characteristics in the study. However, this would have required that children be aware of the nonverbal pattern in the clips they were watching, and past work on nonverbal bias suggests that people, even adults, do not typically notice subtle patterns such as this one. For example, in past work, Weisbuch and Ambady (2009) offered participants financial incentives for correctly identifying the pattern present in the clips they watched. Yet, no one correctly guessed the pattern of nonverbal bias at above chance (Weisbuch & Ambady, 2009; Weisbuch et al., 2009). Therefore, we regard this possibility as unlikely.

Finally, the third threat to external validity is that mass media may provide a peculiar context for nonverbal gender-role bias and one that may not generalize beyond that context. First, child participants did not actively contribute to the interactions they saw. Given that perceptions can differ based on an observer's goals (E. J. Gibson & Walker, 1984; J. J. Gibson, 1979; McArthur & Baron, 1983; Neel & Lassetter, 2019), this is not a trivial limitation and deserves consideration—it is possible that an observer's action goals (e.g., talking to a child that was featured in one of the clips) would moderate the influence of nonverbal gender-role bias on that child. Second, participants saw social interactions presented on a television screen rather than observing interactions of "real people." TV characters are not real even if actors are real, and any social interactions presented on a screen are necessarily less proximal than seeing a social interaction in person. Still, these limitations are not unique to our approach—many, perhaps most, social psychology studies are now conducted via computer screens, and this is especially true for research that employs faces, bodies, pictures, words, or videos as stimuli. Moreover, the fact that children changed their beliefs about real people (parents, peers) from observing "unreal" social interactions suggests that the television context of the current studies led to changes in children that may impact their behavior with real people. Finally, although television may be a peculiar ecology, it is one that children frequently encounter in their daily lives. We selected stimuli from the ecologies that child participants see for 4 hr a day (on average), thereby taking a more "bottom-up" approach to the social environment than the more "top-down" approach taken when experimenters create their own stimuli from scratch. We believe this approach enhances the

external validity of our conclusions, but it is important to note that the cultural snapshots methodology is still imperfect with regard to external validity.

Conclusion

Theories in cultural psychology have pointed to the importance of intersubjective norms for predicting behavior and, indeed, children show evidence of developing intersubjective gender norms in early and middle childhood. Until now, however, there was uncharted territory in terms of *how* children learn these norms and in terms of whether these norms predicted children's behavior. In this series of studies, results indicate (a) a small but consistent ecological pattern of televised nonverbal bias in which gender-stereotypical characters are treated more positively than gender-counterstereotypical characters (Study 1), (b) that girls who have developed sensitivity to low-intensity emotional displays change their intersubjective norms in response to perceiving this nonverbal bias (Studies 2 and 3), and (c) that girls' perceived norms about gender roles predict their own gendered behavior, whereas their personal beliefs do not (Studies 2 and 3). All told, the studies reported here provide evidence on how culturally shared gender roles may "get into the heads" of children.

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