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ORIGINAL ARTICLE

The Cognitive Construction of Gender Stereotypes: Evidence for the Dual Pathways Model of Gender Differentiation

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Abstract The dual pathways model of gender differentiation suggests two possible pathways that examine the relationships between gender-typed interests and gender stereotypes: (a) an attitudinal pathway model, which suggests that stereotypes may shape interests for gender-schematic children, and (b) a personal pathway model, which suggests that personal interests may lead to the construction of stereotypes that are in line with one's interests (Liben and Bigler 2002). In Study 1, the personal pathway model was tested by presenting children in the United States ($N = 51$, $M_{age} = 3.99$ years-old) with novel toys and assessing the congruence between interests and stereotypes. Results indicated a significant relationship between personal interests and stereotypes such that higher levels of personal interest in toys were associated with more congruent gender stereotypes—stereotypes in which the children endorsed the belief that the toy was only for same-gender children or for both genders. In Study 2, the attitudinal pathway was tested by presenting children in the United States ($N = 57$, $M_{age} = 4.03$ years-old) with novel toys that were labeled as "for boys" or "for girls." Results indicated that gender-schematic children (those who endorsed higher levels of cultural gender stereotypes), but not gender-aschematic children (those who endorsed lower levels of cultural gender stereotypes) were more interested in toys labeled as for their gender than toys labeled as for the other gender. Thus, the results demonstrate that the pathways between these two constructs may be dependent on environmental information, individual differences in personal interest, and gender schematicity as predicted by the dual pathways model.

Keywords Toy selection · Sex role attitudes · Schema · Human sex differences · Interests · Stereotypes

Gender is a principal psychological construct that affects many areas of children's lives including their behavior, interests, academic performance, sense of self, and cognitive development (see Blakemore et al. 2009, for a review). One of the principal facets of gender development is the creation and utilization of gender stereotypes—beliefs about which activities, occupations, and behaviors are appropriate for males and females (Liben and Bigler 2002). These stereotypes are often prescriptive of children's and adults' behaviors, interests, attitudes, and activities (Prentice 2002). Children's personal endorsement of gender stereotypes begins around age three and peaks at approximately ages five to seven, at which point children's gender stereotypes become more flexible (Martin and Ruble 2004; Ruble et al. 2007; Trautner et al. 2005, in Germany). Thus, research examining the cognitive processes involved in gender development during the preschool years is ideal and necessary for scholars and policy workers who aim to reduce these gender stereotypes that limit children's choices and activities by way of their prescriptive nature (Bigler and Liben 2007).

The purpose of the present studies is to examine the causal paths between stereotypes and gender-typed interests among preschool children in the United States. Specifically, I use two studies to test the models included within Liben and Bigler's (2002) dual pathways model of gender differentiation: (a) the

Portions of these studies were presented at the biennial meeting of the Society for Research in Child Development and at the Gender Development Research Conference.

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personal pathway model and (b) the attitudinal pathway model. The personal pathway model, which suggests that personal interests may lead to the construction of gender stereotypes, is tested in Study 1 by presenting children with novel toys and asking them to indicate their personal interest and gender stereotypes about each item. In this first study, I test the prediction that a child's high level of interest in an item would lead to stereotypes that are congruent with the child engaging with the item.

The attitudinal pathway model, which posits that gender stereotypes shape personal interests, is tested in Study 2 by presenting children with novel toys that are given explicit gender associations and then asked to indicate their personal interest in each item; individual differences in gender schematicity are also considered. In this second study, I test the prediction derived from the attitudinal pathway model that gender stereotypes provided to children will influence their interest in the items presented. Combined, these studies contribute to the literature in important ways by (a) testing the complex intersection of personal interests and stereotyped attitudes among young children, (b) examining the pathways and constructs examined in the dual pathways model proposed by Liben and Bigler (2002), and (c) increasing methodological consistency of assessing interests and gender stereotypes throughout the developmental psychology literature while testing these theoretical models.

In the United States, gender stereotypes of toys, activities, and occupations are prevalent among children (Liben and Bigler 2002). Gender is emphasized in children's environments through numerous social agents. Marketing corporations have increasingly emphasized gender since the 1970s with gender-typed colors, male or female models, and explicit gender labels denoting the target audience of the toys (Orenstein 2011; Sweet 2013). Parents often provide children with gender-typed toys, activities, and environments (Wood et al. 2002) and influence children's development of gender stereotypes by engaging in a traditional or nontraditional division of labor. Children whose parents' engage in traditional gender roles endorse more gender stereotypes than children whose parents' engage in nontraditional gender roles (Fulcher 2011). Starting in preschool, children begin to select into gender-segregated play groups, and play with other gender peers is limited (Maccoby 1998). Peers within these groups often restrict children's cross-gender activities and toy preferences via social exclusion (Miller et al. 2013). Teachers and schools also emphasize gender by organizing children's environments by gender and drawing attention to gender through labeling—factors that are demonstrated to increase the endorsement of gender stereotypes among children (Hilliard and Liben 2010). Many school districts have even adopted single-sex curriculums that emphasize gender differences and have been shown to increase stereotypic attitudes in children (Bigler and Signorella 2011; Halpern et al. 2011).

Taken together, this literature highlights the importance of gender and gender roles in U.S. culture—an emphasis that is not as prevalent in other cultures that have adopted gender egalitarian legal and cultural practices such as Sweden and Norway (Sjöberg 2004). Many theoretical perspectives suggest that these socializing agents shape children's gender stereotypes (see Blakemore et al. 2009, for a review); however, cognitive developmental perspectives suggest that children are motivated to attend to gender-related information in their environments and construct stereotypes based on external cues and internal thought processes. Throughout this literature review, the studies draw on U.S. samples unless otherwise noted.

Constructivist Perspectives on Gender Stereotypes

Cognitive models of gender development posit that gender stereotypes are an important dimension of children's gender schemata and have significant links to gender-typed attributes (e.g., behaviors, interests, and traits). These models are considered constructivist because children are actively, cognitively constructing stereotypes through interaction with their environment (Coyle and Liben 2016; Liben and Bigler 2002). Prominent constructivist models of gender stereotyping include social cognitive theory (Bussey and Bandura 1999), cognitive developmental theory (Kohlberg 1966), and gender schema theory (Bem 1981; Martin and Halverson 1981). Gender schema theory, in particular, has generated a large amount of research across many domains of gender including the development of gender-typed interests in toys and gender stereotypes of toys (Martin et al. 1995; Weisgram et al. 2014).

Martin and Halverson's (1981) gender schema theory (GST) argues that children are highly motivated to gather information from their environment (e.g., peers, media, parents) about gender due to the salience of gender in their lives and our society (also see Bem 1981; Bigler and Liben 2007). This gender-related information is then cognitively processed and used to create gender schemas, and these schemas are proposed to affect children's interests and behaviors. Gender schemas may affect interests and behaviors by leading a child to avoid previously attractive activities, occupations, or behaviors because they are considered gender inappropriate and to engage in other activities, occupations, or behaviors that are considered gender appropriate. Thus, in this model, the stereotypes and schemas that a child holds play an important role in guiding his or her behaviors and interests. In their research supporting GST, Martin et al. (1995, p. 1463) presented children with novel toys of varying levels of attractiveness and gave them labels indicating that the toy was "for boys" or "for girls." They found that children who remembered the given gender labels used the explicit labels to make decisions about their own personal interest in toys and

predictions of other children's interests. Specifically, they were more interested in toys labeled as for their gender than toys labeled as for the other gender and predicted that children would be more interested in toys with labels that matched their peers' gender than toys that did not match their peers' gender.

Although Martin and Halverson (1981) emphasized the strong role of stereotypes in influencing behavior in GST, more recently attention has been given to how children develop stereotypes based on their own personal experiences (see Liben and Bigler 2002; Martin and Dinella 2012). According to Martin (2000), children's own experiences and preferences could be extrapolated to others by children relying on their gender theories in which they assume similarities between themselves and members of their own gender. These ideas suggest that a reverse pathway—preferences shaping stereotypes—may be possible (Martin et al. 1995). For example, in two studies by Martin et al. (1995), children were presented novel toys of varying attractiveness, but were not given any additional information about the items. They were then asked to indicate their own interest and the potential interest of their same-gender and other-gender peers. A "gender centric" pattern emerged (p. 1454). Specifically, when children showed high levels of interest in the items, they predicted that same-gender peers would also have high levels of interest and that other-gender peers would have lower levels of interest. This body of research suggests that the pathways between stereotypes and interests may run both ways depending on the context in which they develop. The directional pathways between stereotypes and interests have been explored in Liben and Bigler's (2002) dual pathways model of gender differentiation.

Dual Pathway Model of Gender Differentiation

In their monograph, Liben and Bigler (2002) presented a cognitive developmental approach that carefully integrated and explained how children's behavior can be influenced by stereotypes, and how stereotypes can develop based on children's own behavior. As noted earlier, Liben and Bigler present two models that investigate the directional relationships between children's stereotypes and behavior: the attitudinal pathway model and the personal pathway model. The *attitudinal pathway model* parallels gender schema theory but places greater emphasis on individual differences in children's gender schematicity or "the degree to which individuals process information along gender lines" (Wilansky-Traynor and Lobel 2008, in Isreal, p. 548; see also Bem 1983). Gender-schematic children typically endorse gender stereotypes and use gender schemas to make decisions, whereas gender-aschematic children do not (Bem 1983). The attitudinal pathway model asserts that gender-schematic children will use cognitive processes similar to those outlined in gender schema theory; gender-aschematic children, however, will consider personal interests without regard to gender stereotypes associated with an item.

In their test of the attitudinal pathway model with familiar items (occupations, activities, and traits), Liben and Bigler (2002, p. 35) hypothesized that "the relation observed between gender-typing of others [stereotypes] and gender-typing of the self [interest] will be higher in individuals with highly stereotyped attitudes toward others than it will be in individuals with less-stereotyped attitudes toward others." Longitudinal data and contingency analyses found support for this hypothesis among elementary school children. In the test of the attitudinal pathway model presented in the following study, the relationship between a given stereotype of a novel item and children's interest in each item is assessed for children with more stereotyped attitudes and children with more egalitarian attitudes. These two groups of children are conceptualized here as gender-schematic and gender-aschematic, respectively. However, research concerning gender schematicity has conceptualized this construct in a variety of different ways including assessing stereotypes of others (Lindsey and Zakahi 1996) and gender-typing of self (Carter and Levy 1988; Frabel and Bem 1985; O'Brien et al. 2000)—constructs that are linked in the dual pathways model of gender differentiation.

Liben and Bigler's (2002) personal pathway model investigates the reverse pathway that can occur between stereotypes and behavior. The personal pathway model suggests that personal interest in an activity, object, or occupation results in the construction of stereotypes that are congruent with an individual's gender (e.g., only for my gender or for both boys and girls). Thus, a boy who is interested in a princess wand may be more likely to have a gender-congruent stereotype (i.e., say a toy is only for boys or for both boys and girls) about the toy than a boy who is uninterested in a princess wand. However, a boy who is uninterested in a princess wand may reinforce the cultural stereotypes with a stereotype that is incongruent with his gender (i.e., only for girls). Liben and Bigler note that this construction of gender-incongruent stereotypes for low-interest items is more likely to apply to gender-schematic than to gender-aschematic children. In their work, Martin et al. (1995) posit a similar gender-centric model in which they suggest that children will endorse gender-congruent stereotypes for high-interest items and gender-incongruent stereotypes for low-interest items.

Martin and Dinella (2012) recently explored this gender-centric perspective and suggested two processes by which stereotypes are constructed based on a child's personal experience. A first process entails engaging with a new attractive activity and then forming congruent gender stereotypes based on a child's high level of interest to ensure the new stereotype is congruent with his or her new found interests. A second process that was identified occurs when there is dissonance between a

previously held stereotype (presumably shaped by societal norms) and newly acquired experience with an item. For example, a child who engages in a gender-inappropriate activity may find he or she enjoys it, and thus experiences incongruence between his or her stereotype and interests. To resolve the dissonance and make the interests congruent with his or her stereotypes, the child can either disengage from the activity (as gender schema theory and the attitudinal pathway model would suggest) or could modify the stereotype to make it more congruent (e.g., "this activity is for both boys and girls"). In my test of the personal pathway model presented here, I examine the congruity between children's own interest in a novel item and the congruity of a constructed stereotype of the item.

Research supports both parts of the dual pathways model. For the attitudinal pathway model, research supports the distinction in schematicity, finding within-gender differences in toy, activity, and occupation preferences between gender-schematic and gender-aschematic children (Carter and Levy 1988; Coyle and Liben 2016; Lobel and Menashri 1993, in Isreal; Martin and Dinella 2012; Patterson 2012; Wilansky-Traynor and Lobel 2008, in Isreal). Although much research has been conducted using assessments of gender-typed interests and gender attitudes about culturally stereotyped activities, occupations, and behaviors (Liben and Bigler 2002; Signorella and Frieze 2008), research with novel items is necessary to disentangle the cultural stereotypes of an item from the properties of the item itself. Here, I provide additional experimental evidence for the attitudinal pathway model using novel toys. Based on the theoretical model and studies reviewed previously, I expect that explicit labels will affect children's interest in novel toys such that they will be more interested in toys said to be associated with their gender than toys not associated with their gender—a trend I predict would be more prevalent among gender-schematic children than gender-aschematic children. Prediction of other children's interest will also follow gender-typed patterns for gender-schematic, but not aschematic, children.

Evidence for the personal pathway model using novel items is limited in comparison to that offered by gender schema theory and other cognitive models of gender development. Research with novel items demonstrates that children use a "gender-centric" pattern when considering others' interests (Lam and Leman 2003, in the United Kingdom; Martin et al. 1995, p. 1454) and also demonstrates how children explain this pattern of behavior in a constructivist manner. When examining children's interest in occupations, Liben and Bigler (2002) demonstrated that when individuals were interested in a cross-gender job, they were likely to have flexible stereotypes about the job (e.g., saying that both men and women can have that job). Based on the tenants of the personal pathway models and the research reviewed here, I expect that children's personal interest in the novel toys presented to them will shape their stereotypes and perceptions of others' interests. Specifically, if a child is highly interested in the novel item, children will form gender-congruent stereotypes and also will predict that children of the same gender will like the item. If a child is not interested in the novel items, the child may form gender-incongruent stereotypes and may predict that children of the same gender will not like the item.

The Present Studies

The studies presented here test both of the directional pathways between personal interests and stereotypes—the dual pathways presented by Liben and Bigler (2002). In these studies, I extend previous research on the dual pathways model by adopting the novel toy methodology used in Martin et al.'s (1995) work. In each study, children are presented with a novel toy and asked to indicate their personal interest, explicit stereotypes, and predictions of other children's interests, predictions that served as an estimate of the endorsement of stereotypes in Martin et al.'s study. In addition, children are asked directly who should engage with each novel toy. In Study 1, the personal pathway model is tested by introducing children to the novel items without gender associations present and by investigating how their personal interest relates to the construction of explicit gender stereotypes and perceptions of other boys' and girls' interests in the items. In Study 2, the attitudinal pathway model is tested by introducing novel items and labeling each item with explicit gender stereotypes. The identical constructs as Study 1 are assessed and the intersection of interest and stereotype development with gender schematicity is also explored.

Study 1

In Study 1, I examined the personal pathway model by exploring the congruence between preschool children's personal interests and constructions of gender stereotypes and predictions about others' interests using novel items. Children were presented with small items described to them as toys that were selected to be unfamiliar to them and then were asked to indicate their interest, stereotypes, and predictions of other children's interests. I predicted that when children are highly interested in an item, they will endorse gender-congruent stereotypes (i.e., beliefs that the item is only for their own gender or for both boys and girls), but when children are not interested in an item, they will endorse gender-incongruent stereotypes (i.e., beliefs that the item is only for the other gender). Thus, there would be a positive relationship between personal interest and the congruity of the stereotypes constructed for each item (Hypothesis 1a). Based on work by Martin et al. (1995), I also expected that children's personal interests would be positively correlated with the predicted interests of same-gender

peers but negatively correlated with the predicted interests of other-gender peers (Hypothesis 1b).

Method

Participants

Participants included 51 preschool children recruited from on-campus child care facilities at a midsized university in the Midwestern United States. Permission slips were distributed to parents of children at the child care center inviting participation in the study. Only those children whose parents returned permission slips and assented to participation were tested and included in the study. There were no significant gender differences across demographic variables. Demographic information of the participants can be found in Table 1.

Materials

Following Martin et al. (1995), novel items were selected from toys or household items with which children likely had little familiarity; they ranged in attractiveness and were believed to be gender-neutral. Potential items were pilot-tested with four preschool-aged children. Children were asked who could play with each item: *only boys*, *only girls*, or *both boys and girls*. Each item presented was judged to be unfamiliar and rated by the children as for both boys and girls. It is important to note that these children may have formed these congruent stereotypes via the pathways that are being tested, a hypothesis that was unable to be tested with this small group. Items (and the label given to children) included: a glowing soft toy (gloworm), Newton's cradle (clicking balls), pet rock (pet rock), and a paperweight made of clear acrylic and containing water and plastic dolphins (dolphin box). Other novel items were tools used for various purposes that were portrayed to children as toys: a snowboarding ratchet (widget), a lemon zester (zester), and an eyelash curler (squeezer). One item, the Rubik's Cube, was deemed unfamiliar by the children in the pilot group, and it was presented to all children, but was subsequently eliminated from further analyses due to a high level of familiarity among the preschool sample (34 of the 51 children were familiar with the item).

A three-point scale was used to assess personal interest and perceptions of others' interest with a frowning face depicting low interest, a neutral face depicting moderate interest, and a smiling face depicting great interest, with response options of 1 (*not at all*), 2 (*a little bit*), and 3 (*a lot*), respectively. Children were asked to point to the picture that reflected how much they liked different items. Stereotypes were assessed using a scale with response options of *only boys*, *only girls*, and *both boys and girls*. Children were asked to point to symbols (restroom icons familiar to the children) representing males, females, or both, as used in Liben and Bigler (2002).

Table 1 Demographic information for children in Studies 1 and 2

	Study 1 ($N=51$)	Study 2 ($N=57$)
Boys		
n	25	29
Age: *M* (*SD*)	3.96 (.78)	3.84 (.69)
Range	3–5	3–5
Race		
European American	21 (84 %)	27 (93 %)
Hispanic American	2 (8 %)	0 (0 %)
African American	1 (4 %)	1 (3 %)
Asian American	0 (0 %)	0 (0 %)
Biracial American	1 (4 %)	1 (3 %)
Girls		
n	26	28
Age *M* (*SD*)	4.02 (.71)	4.22 (.73)
Range	3–5	3–5
Race		
European American	23 (89 %)	25 (88 %)
Hispanic American	1 (4 %)	1 (4 %)
African American	0 (0 %)	0 (0 %)
Asian American	0 (0 %)	1 (4 %)
Biracial American	1 (4 %)	1 (4 %)

Procedures

Children were interviewed individually in a quiet part of their regular classroom by one of three female experimenters. They were told that the experimenter wanted to talk to them about toys. The procedure began with familiarizing children with the scales used on the measures (see Martin et al. 1995). Participants were presented with the gender-neutral, unfamiliar items described previously in a random order. For each item, the experimenter labeled the toy (e.g., "This is a zester.") and, for items with moving parts, she demonstrated the toy (e.g., turned the ratchet to make a clicking sound; opened and closed the eyelash curler). The experimenter then gave the toy to the child to allow him or her to inspect and manipulate it for 30 s. The experimenter then took the toy from the child and placed it in front of them in view and asked him or her to respond to questions about the toy assessing familiarity, interest, stereotypes, and perception of other boys' and girls' interests. In most cases, children were able to finish the entire protocol. However, five children were unable to sit through the entire protocol of eight toys due to restlessness. In those cases, the data for the other toys was included, thus leading to an uneven number of responses on some of the toys. Because toys were randomly selected for inclusion, these children are randomly distributed across toys.

Measures

For each item, children were asked to indicate familiarity by specifying whether they had seen the toy before with response options being *Yes*, *No*, or *I don't know*. Next, interest was assessed by asking "How much would you like to play with this toy?," with response options of 1 (*not at all*), 2 (*a little bit*), and 3 (*a lot*). To assess gender stereotypes formed about the toy, children were asked, "Who should play with this toy?," with response options of *only boys*, *only girls*, or *both boys and girls*. The wording of this question follows guidelines developed by Signorella et al. (1993) advising researchers to include an option for both when assessing stereotypes. Based on these responses, children's stereotypes were dummy coded to determine whether each stereotype was gender congruent (i.e., response included *only [child's own gender]* or *both boys and girls*, dummy code = 1) or gender incongruent (i.e., response included *only [other gender children]*, dummy code = 0). Following Martin et al. (1995), children's perceptions of same- and other-gender children's interest was also assessed by asking "How much would other [girls/boys] like to play with this toy?" and using response options that are identical to those used when indicating personal interest. The experimenters alternated which gender they addressed first when asking these two questions.

Results and Discussion

Preliminary Analyses

As a manipulation check, familiarity to the novel toys was assessed. Children maintained a relatively low level of familiarity for novel items presented with percentages of children who were familiar with the items ranging from 16 to 32 %. Percentages of familiarity for each item are presented in Table 2. To assess possible gender associations of the items presented, gender differences in personal interest in the items were examined. A one-way MANOVA was performed on children's interest in toys indicating no significant main effect of gender, $F(1, 37) = 1.23$, $p = .31$, *Wilk's* $\Lambda = .79$, nor were there any gender differences on individual items. Means (and standard deviations) of interest levels can be found in Table 2.

Table 2 Familiarity with and personal interest in toys, Study 1

Toy	Familiarity *n* (%)	Boys' interest *M* (*SD*)	Girls' interest *M* (*SD*)
Clicking balls	14 (27.5 %)	2.52 (.73)	2.64 (.66)
Dolphin	14 (27.5 %)	2.91 (.41)	2.82 (.50)
Gloworm	8 (15.7 %)	2.00 (.95)	2.32 (.78)
Pet rock	15 (29.4 %)	2.52 (.79)	2.45 (.80)
Squeezer	16 (32.0 %)	2.70 (.70)	2.73 (.55)
Widget	10 (19.6 %)	2.65 (.64)	2.45 (.74)
Zester	10 (19.6 %)	2.43 (.72)	1.95 (.98)

Interest scores range from 1 (*low*) to 3 (*high*). No significant gender differences in interest were found

Tests of Primary Hypotheses

With Hypothesis 1a, I predicted that there would be a positive relationship between personal interest and the congruity of the stereotypes constructed for each item. To assess whether there is a relation between children's own interest in a novel toy and their personal endorsement of the gender stereotype, a point biserial correlation was calculated between personal interest and whether or not the child endorsed gender-congruent stereotypes. Relationships between interest and congruity were examined for each item separately following Liben and Bigler's (2002) analysis; in addition, a weighted average of each correlation was computed to extract an overall pattern.

For both boys and girls, four of the seven items showed significant positive correlations between interest and congruity. Results indicated that among boys and girls, high interest was more likely to be associated with gender-congruent responses than gender-incongruent responses. Correlations for each gender are presented in Table 3. Aggregating across items using weighted correlations, significant relationships between congruity and interest were also found ($r_{girls} = .47$,

Table 3 Correlations between constructed stereotypes and personal interest, Study 1

Toys	Boys	Girls	Combined
Clicking balls	.66*	.70*	.68*
Dolphin	.00	.48*	.24
Gloworm	.18	.67*	.39*
Pet rock	.46*	.30	.37*
Squeezer	.56*	.30	.46*
Widget	.45*	.51*	.49*
Zester	.14	.29	.33*
Weighted average	.38*	.47*	.42*

Constructed stereotypes were dummy coded to indicate whether a child was gender-congruent (dummy code = 1) or gender-incongruent (0) in her or his categorical stereotype endorsement. Gender-Congruent indicates child responded by saying toy is only for [his/her gender] or for both boys and girls. Gender-Incongruent indicates child responded by saying toy is only for [the other gender]. Thus, a positive correlation indicates that as children were more interested in a toy, they were more likely to have gender-congruent stereotypes. For boys, df = 22 for each correlation except for one item (pet rock) where df = 21. For girls, df = 24 for three items (dolphin, pet rock, squeezer), df = 23 for two items (clicking balls, zester), and df = 22 for two items (widget, gloworm)

* $p \leq .05$

$p = .01$; $r_{boys} = .38$, $p = .05$). Results largely confirmed the hypotheses and supported the personal pathway model in that there was a significant relationship between children's personal interest and endorsement of gender-congruent stereotypes. Because each of the items is unfamiliar and considered gender-neutral, and thus the child has no previous stereotypes, the construction of the stereotype is a likely result of the personal level of interest a child has in the item (Liben and Bigler 2002).

With Hypothesis 1b, I expected that children's personal interests would be positively correlated with the predicted interests of same-gender peers and negatively correlated with the predicted interests of other-gender peers. The relation between children's personal interest in the novel items and their perceptions of same- and other-gender children's interest was examined using bivariate correlations for each item separately. Results of the correlations partially confirmed this hypothesis. Among boys, results indicated that there were significant positive correlations between personal interest and perceptions of other boys' interest for five of the seven items, with a significant overall weighted average ($r = .42$, $p = .04$). There were no significant correlations among boys' personal interest and perceptions of girls' interest in the novel toys (weighted average $r = .06$, $p > .05$). Among girls, results indicated that there were significant positive correlations between personal interest and perceptions of other girls' interest for four of the seven items, with a significant overall weighted average ($r = .46$, $p = .02$). There were no significant correlations among girls' personal interest and perceptions of boys' interest in the novel toys (weighted average $r = .22$, $p > .05$). Correlations are presented in Table 4.

Table 4 Correlations among personal interest and judgments of same- and other-gender peers' interest, Study 1

	Boys' personal interest		Girls' personal interest	
Toys	Other boys' interest	Other girls' interest	Other boys' interest	Other girls' interest
Clicking balls	.53*	.19	.37	.76*
Dolphin	.25	.25	.32	.42*
Gloworm	.40*	−.10	.00	.50*
Pet rock	.36	.20	.25	.36
Squeezer	.46*	−.01	.23	.34
Widget	.41*	.05	.11	.49*
Zester	.58*	−.13	.30	.35
Weighted average	.42*	.06	.22	.46*

For boys, $df = 22$ for all correlations except for those associated with the pet rock ($df = 21$). For girls, $df = 23$ for all items except two (widget, pet rock) where $df = 22$

* $p < .05$

These data confirm the gender-centric pattern found in the literature in predicting others' interests (Martin et al. 1995; Lam and Leman 2003, in the United Kingdom). Children predicted that same-gender peers would have similar interest to themselves, whereas predictions of other-gender peers' interests were not linked to children's personal interest. These findings add to the growing body of literature that has attempted to calibrate better the role of personal experiences in gender development and stereotype formation (Martin and Dinella 2012).

Study 1 suggests that individual differences in personal interests are key in stereotype construction. In Study 2, I investigate individual differences in stereotype endorsement and provide a test of Liben and Bigler's (2002) attitudinal pathway model by presenting gender-schematic and gender-aschematic children with information about the gender appropriateness of the same novel items used in Study 1. Based on these theories, I expect to find that gender-schematic children will be more likely to be influenced by these explicit stereotypes than children who are aschematic.

Study 2

In Study 2, I tested the attitudinal pathway model by presenting preschool children with novel items associated with a prescriptive gender stereotype and assessing interests, taking into account individual differences in the degree to which children endorsed cultural gender stereotypes of familiar items. Gender schema theory suggests that children will show greater interest in items labeled as for their own gender than items labeled as for the other gender. Based on Liben and Bigler's (2002) work, I predicted that there would be an interaction between toy label and gender schematicity such that that children who endorse a high level of cultural stereotypes would show greater interest in items labeled for their own gender than children who endorse low levels of cultural stereotypes. In addition, children who endorse low levels of cultural stereotypes would show greater interest in items labeled as for the other gender than children who endorse a high level of cultural stereotypes (Hypothesis 2a).

Based on research by Martin et al. (1995), I expected that children would make judgments about peers' interests based on the provided gender labels. Specifically, I expected children to predict greater levels of interest for items labeled as for the same gender as the hypothetical peer than items labeled as for the other gender (Hypothesis 2b). Lastly, based on work by Martin and Dinella (2012), I expected that the stereotype that each child endorsed for each item would be congruent with his or her interest in the item (Hypothesis 2c).

Method

Participants

Participants included 57 different preschool children recruited from on-campus child care facilities at a mid-sized university in the Midwestern United States. As in Study 1, permission slips were distributed to parents of children at the child care center and only those children whose parents provided consent and assented to participation themselves were tested and included in the study. Demographic information of the participants can be found in Table 1. There were no significant gender differences across demographic variables.

Materials

The stimuli used for toys were identical except that the gloworm used in Study 1 was unavailable because it was a childhood toy of a research assistant who left the lab upon the completion of Study 1. It was replaced by a red alien hat (an item that was designated by a team of undergraduates as gender-neutral). The scales used to measure interests and stereotypes were identical to Study 1. However, children in Study 2, unlike Study 1, were shown photographs of children holding each toy. Parental approval was gained before taking the photographs. The pictures showed a European American boy and a European American girl (ages 5 and 4, respectively) and both were wearing a white shirt with no images or writing. All photographs were taken with a white wall as the background. The children held each toy at chest level so it was clearly visible. The photographs of the girl with each item were mounted on a pink backing, and the photographs of the boy were mounted on a blue backing.

Procedures

The procedures for this second study were similar to Study 1. However, in Study 2, as the experimenter presented each item to the child, the toys were labeled as either "for boys" or "for girls" (randomized for each item) and the photograph of a gender-congruent child was shown holding the item. The toy and the photograph were laid in front of the child for their viewing, and then he or she was asked to indicate their interests, stereotypes, and perceptions of others' interests. Also, in Study 2, children were given Liben and Bigler's (2002) POAT-AM, an assessment of gender stereotyping of familiar toys designed for preschool children, in a separate session approximately a week following the novel item session with a different experimenter.

Measures

Using identical questions to Study 1, children's personal interests, endorsement of stereotypes, and perceptions of same- and other-gender peers' interests were assessed. Children were also given the POAT-AM (Liben and Bigler 2002). Participants were presented with 6 masculine, 6 feminine and 2 gender neutral activities and asked, "Who should play with [each item]?," with response items including *only boys*, *only girls*, or *both boys and girls*. Sample items include: dress-up clothes, baby dolls, and robots. A composite score was computed by summing the number of *both boys and girls* responses across all items. Using an approximate median split on this measure, children were divided into two groups: gender-schematic children ($n = 30$, gave two or fewer *both* responses) and gender-aschematic children ($n = 27$, gave three or more *both* responses).

Results and Discussion

Preliminary Analyses

A one-way MANOVA was conducted to investigate any possible gender differences in interest in the items. Results indicated no significant gender differences in interest in each of the items. As a manipulation check, I examined children's responses to the question, "Who should play with this toy?" (*only boys*, *only girls*, or *both boys and girls*). Results for boys and girls both indicated that children's stereotypes were not strongly matched to the given gender labels (see Table 5). As a follow-up, stereotypes were examined for gender-schematic children (those who endorse higher levels of cultural gender stereotypes) and gender-aschematic children (those who endorse lower levels of cultural gender stereotypes) separately. Here, gender-schematic children were more likely to indicate an item was for *only boys* or *only girls* whereas gender-aschematic children were highly likely to indicate the novel items were for *both boys and girls* (see Table 5).

The data indicate that about three-quarters of the time, children's stereotypes were congruent with the given stereotype; however, their congruent responses were often divided between saying the item is *only for [the stated gender]* and for *both boys and girls*. Given that these findings did not exactly match the label given by experimenters, these findings suggest that the given labels may not have been as salient to children compared to other studies using a similar approach (Bradbard et al. 1986; Weisgram et al. 2014) given that children were briefly given information about the toy stereotypes. These findings also suggest that although children were attending to the gender label given, they may have ignored it and instead based their stereotypes on their levels of interest as the personal pathway model and results from Study 1 would suggest. Children were often using gender-congruent stereotypes

Table 5 Stereotypes for novel toys labeled by experimenters as "For Boys" or "For Girls," Study 2

Children	Only for boys *n* (%)	Only for girls *n* (%)	For both boys and girls *n* (%)	χ^2
Toys labeled "For Boys"				
Boys	35 (35 %)	11 (11 %)	54 (54 %)	27.86*
Girls	27 (28 %)	31 (32 %)	39 (40 %)	2.31
Gender-schematic children	44 (43 %)	23 (22 %)	36 (35 %)	6.54*
Gender-aschematic children	21 (23 %)	18 (20 %)	52 (57 %)	23.36*
Toys labeled "For Girls"				
Boys	24 (23 %)	33 (32 %)	46 (45 %)	7.12
Girls	24 (25 %)	39 (41 %)	32 (34 %)	3.56
Gender-schematic children	26 (26 %)	39 (39 %)	35 (35 %)	2.66
Gender-aschematic children	22 (22 %)	16 (17 %)	58 (60 %)	32.25*

*$p < .05$

which would be linked with overall high level of interest in the toys. I also found that gender-schematic children were most likely to say the items were only for the gender stated by the experimenter—and thus were more accurate at remembering the labels—and least likely to say that the items were for the other gender. Gender-aschematic children were more likely to say that the items were for both boys and girls and were equally likely to say that the toy was for the gender indicated by the explicit gender label and for the other gender. The discrepancy between gender schematic and gender-aschematic children suggests that they may engage in two different pathways of processing, with schematic children attending to gender labels using the pathways suggested by GST and the attitudinal pathway model and with gender-aschematic children using the pathway suggested by the personal pathway model. This finding suggests that many children are cognitively constructing stereotypes for themselves rather than just adopting stereotypes found in the environment.

Tests of Primary Hypotheses

With Hypothesis 2a, I predicted that there would be an interaction between toy label and gender schematicity such that that children who endorse a high level of cultural stereotypes would show greater interest in items labeled for their own gender than children who endorse low levels of cultural stereotypes. Children who endorse low levels of cultural stereotypes would show greater interest in items labeled as for the other gender than children who endorse a high level of cultural stereotypes (Hypothesis 2a). A 2 (participant gender: male, female) x 2 (schematicity: schematic, aschematic) x 2 (toy label: same gender, other gender) mixed effects ANOVA was conducted with toy type as a repeated measures factor. Results indicated a significant interaction between schematicity and toy label, $F(1, 52) = 9.03$, $p = .004$, $\eta^2 = .15$. See Table 6 for means and standard deviations. A repeated measures analysis (with Bonferroni correction) was conducted to examine the main effect of toy label within each schematicity group. As predicted by the attitudinal pathway model, children who endorse more gender stereotypes (i.e., gender-schematic children) were affected by the gender labels showing greater interest in toys labeled as for the same gender and less interest in toys labeled as for the other gender, $F(1, 27) = 5.88$, $p = .02$, $\eta^2 = .18$. Contrary to predictions, children who endorse fewer gender stereotypes (i.e., gender-aschematic children) showed no difference in interest. This finding specifically indicates that research examining the effect of gender labels (Martin et al. 1995; Weisgram et al. 2014) should also examine individual differences in gender schematicity as a way of determining who is affected most

Table 6 Interest in toys labeled as for the same gender or other gender by gender of child and schematicity, Study 2

	Boys		Girls		Combined	
Toy labeling	Schematic *M* (*SD*)	Aschematic *M* (*SD*)	Schematic *M* (*SD*)	Aschematic *M* (*SD*)	Schematic *M* (*SD*)	Aschematic *M* (*SD*)
Toy labeled for same gender	2.62 (.54)	2.61 (.48)	2.79 (.31)	2.46 (.59)	$2.71\ (.43)_a$	$2.53\ (.53)_a$
Toy labeled for other gender	2.61 (.56)	2.73 (.40)	2.45 (.54)	2.71 (.41)	$2.54\ (.53)_b$	$2.73\ (.39)_a$

Interest scores range from 1 (*low*) to 3 (*high*). Subscripts indicate significant differences within columns ($p < .05$)

by gender labels and what pathways children use in the development of gender-typed interests when stereotypes are present.

With Hypothesis 2b, I expected children to predict greater levels of interest for items labeled as for the same gender as the target peer than items labeled as for the other gender. Thus, a 2 (participant gender: male, female) x 2 (gender schematicity: schematic, aschematic) x 2 (toy label: for boys, for girls) x 2 (predicted interest: other girls', other boys') ANOVA was conducted with toy label and predicted interest as within-subjects variables. Means and standard deviations are presented in Table 7. An interaction between gender and perceived interest was present, $F(1, 52) = 18.51, p < .001, \eta^2 = .26$. The predictions of other boys' interests were higher for boys than for girls. The reverse pattern was found for predictions of other girls' interests, with girls rating other girls' interests as higher than boys rated girls' interests. There was no significant effect of gender schematicity or toy label on children's predictions of others' interest. Given the relatively high level of personal interest in the items, I believe that children predicted that same-gender peers would match their level of interest more so than other-gender peers, as also found in Martin et al. (1995).

To test Hypothesis 2c, I examined the relationship between children's personal interests and stereotype congruence, regardless of the gender-related information provided to them, using correlational analysis as in Study 1. Unfortunately, I was unable to examine the congruency for gender-schematic and gender-aschematic children separately because there was often no variability in the responses of gender-aschematic children. For many items, these gender-aschematic children would all endorse gender-congruent stereotypes; thus, correlations with interest levels could not be performed. Across all children and each toy, the correlations between interest and congruent responses were examined with point biserial correlations. For most toys, there was a significant positive correlation between personal interest and the endorsement of gender-congruent stereotypes (weighted average $r_{boys} = .36$, $p = .04$; $r_{girls} = .32$, $p = .05$; see Table 8). Across toys, a pattern of association between interests and gender congruent stereotypic beliefs also emerged supporting Liben and Bigler's (2002) personal pathway model and research by Martin and Dinella (2012).

General Discussion

Constructivist theories of gender development have examined the relationships between gender-related cognitions—namely gender-typed interests and gender stereotypes—by proposing causal pathways between constructs. Both Martin and Halverson's (1981) gender schema theory and Liben and Bigler's (2002) attitudinal pathways model posit that schemas and stereotypes affect children's interests and behaviors. However, recent scholars of gender development have conducted research into these pathways that expand the understanding of gender development by illustrating that (a) individual difference factors may moderate the relationship between stereotypes and interests and (b) the pathways may additionally run in a reverse pattern from children's interests and preferences to the construction of stereotypes (Liben and Bigler 2002; Martin et al. 1995; Martin and Dinella 2012). The studies presented here notably illustrate the importance of individual differences in the attitudinal pathway model (Study 2) and support the personal pathway model suggesting that children's interests lead to the active cognitive construction of gender stereotypes (Studies 1 and 2).

The present studies provide support for Liben and Bigler's (2002) dual pathways model. In Study 1 where the personal pathway model was tested, I found that high levels of interest in gender-neutral, novel items was associated with gender-congruent stereotypes and that low levels of interest were associated with gender-incongruent stereotypes—suggesting that when children are presented with no

Table 7 Predictions of other boys' and other girls' interests as a function of participant gender and toy label, Study 2

	Boys			Girls		
Perceived interests	Schematic *M* (*SD*)	Aschematic *M* (*SD*)	Combined *M* (*SD*)	Schematic *M* (*SD*)	Aschematic *M* (*SD*)	Combined *M* (*SD*)
Perceptions of other boys' interests						
Toy labeled "for boys"	2.54 (.48)	2.76 (.34)	2.66 (.42)	2.25 (.69)	2.33 (.57)	2.28 (.60)
Toy labeled "for girls"	2.46 (.56)	2.74 (.28)	2.61 (.46)	1.99 (.53)	2.32 (.37)	2.13 (.49)
Combined	2.50 (.46)	2.76 (.40)	$2.64\ (.40)_a$	2.12 (.51)	2.32 (.43)	$2.21\ (.48)_b$
Perceptions of other girls' interests						
Toy labeled "for boys"	2.13 (.61)	2.41 (.58)	2.28 (.60)	2.55 (.48)	2.41 (.39)	2.49 (.44)
Toy labeled "for girls"	2.05 (.75)	2.29 (.60)	2.17 (.67)	2.78 (.32)	2.42 (.58)	2.63 (.48)
Combined	2.09 (.59)	2.35 (.54)	$2.23\ (.57)_a$	2.66 (.33)	2.41 (.35)	$2.56\ (.35)_b$

Predicted Interest levels range from 1 (*low*) to 3 (*high*). Subscripts indicate significant differences between boys' and girls' combined scores ($p < .05$)

Table 8 Correlations between congruity and personal interest in toys, Study 2

Toys	Boys ($n = 29$)	Girls ($n = 28$)	Combined ($n = 57$)
Clicking balls	.06	.27	.17
Dolphin	.09	.13	.11
Alien	.63*	.52*	.57*
Pet rock	.35*	.33	.34*
Squeezer	.67*	.14	.41*
Widget	.17	.57*	.37*
Zester	.47*	.31	.39*
Average	.36*	.32	.34*

Congruity was dummy coded to indicate whether a child was gender congruent (dummy code = 1) or gender incongruent (dummy code = 0) in her or his categorical stereotype endorsement. Gender congruent indicates child responded by saying toy is only for [his/her gender] or for both boys and girls. Gender incongruent indicates child responded by saying toy is only for [the other gender]. Thus, a positive correlation indicates that as children were more interested in a toy, they were more likely to have gender-congruent stereotypes. For boys, $df = 27$ for each item except the pet rock ($df = 26$). For girls, $df = 26$ for each item except for two (clicking balls, squeezer) where $df = 25$

* $p \leq .05$

gender-related information about an item, personal interests play a role in the construction of a new gender stereotype for the item. These findings support and extend the gender-centric perspective suggested by Martin et al. (1995) and confirm the personal pathway model. This construction of gender stereotypes to match personal interest may be the result of children seeking congruence to avoid dissonance between the two cognitive constructs as suggested by Martin and Dinella (2012). Additional work investigating individual differences in gender schematicity as it relates to the personal pathway is needed.

In Study 2, where the attitudinal pathway model was tested, I found that providing children with a gender label related to an item can impact children's personal interests as constructivist theories would predict—but more so for gender schematic children who already process information along gender lines. Gender aschematic children may demonstrate different cognitive pathways, perhaps following the pathways outlined in the personal pathway model described in Study 1 (see Martin and Dinella 2012). Both studies demonstrate the utility of Liben and Bigler's (2002) dual pathways model for understanding gender development.

In both studies, Martin et al.'s (1995) work was extended by investigating individual assessments of children's perceptions of other boys' and other girls' interest in the novel items in relation to the dual pathways. In both studies, a "gender-centric" pattern of predicted interests was found. In Study 1, there were numerous significant correlations between children's personal interests and predictions of same-gender (but not other-gender) peers' interests. In Study 2, children predicted that same-gender peers would have higher interest in novel items than other-gender peers, regardless of the gender-related information given about the items. Given children's high level of personal interest in the items, it is probable that the predictions of same-gender peers' interests are related to personal interests as in Study 1. These studies confirm the "gender centric" pattern suggesting that children believe same-gender peers will be similar to oneself, and they support the idea that these patterns may form the basis of some types of stereotype development (Lam and Leman 2003, in the United Kingdom; Martin et al. 1995).

Importantly, my research also answers Martin and Dinella's (2012) call for more research to examine the congruence between stereotypes and interests among various populations. Although other researchers have examined this congruence using a variety of techniques (Liben and Bigler 2002; Martin and Dinella 2012), the present studies importantly use novel, gender-neutral items to investigate the cognitive construction of stereotypes and interests among preschool children, and they highlight the need for further research exploring congruence and the factors that may moderate it. Gender constructivist research and theoretical models, including the dual pathways models and Martin and Dinella's congruence research, posit that there are not different pathways in the development of stereotypes and interests among boys and girls; however, examining pathways among different gender, age, ethnic, and cultural groups remains a fruitful area of research for future study.

Although the studies presented here provide important support for Liben and Bigler's (2002) dual pathways model, limitations to this work exist. First, in a test of the attitudinal pathway model, I sought to replicate and extend Liben and Bigler's work by examining the congruence between interests (gender-typing of self) and stereotype (gender-typing of others) in novel items among children who endorse a higher level of cultural gender stereotypes and children who endorse a lower level of cultural gender stereotypes. In this work, I have conceptualized these children as gender-schematic and gender-aschematic, respectively, in accordance with previous theory and research (e.g., Liben and Bigler 2002; Martin and Dinella 2012), but also recognize that grouping participants on a measure of cultural stereotypes may not fully embody the concept of gender schematicity—the degree to which individuals process information according to gender. As noted earlier, other research conceptualizes gender schematicity in other ways. Research by Carter and Levy (1988) introduced a method of categorizing children as schematic or aschematic based on their level of gender-typed interests on a timed-forced choice test. However, it is unclear what the role of the endorsement of cultural gender stereotypes is in the child's schematicity. Does the child who shows more cross-gender-typed interests (i.e., a gender aschematic child) endorse fewer cultural stereotypes because they are aschematic or is the egalitarian nature of their stereotypes a precursor to their cross-gender interests? This question

illustrates the need for researchers to address the congruity between stereotypes and interests and the directional pathways between these variables. In addition, I contend that researchers should address the construct of gender schematicity, that is, how it could be conceptualized and operationalized in future research.

In the test of the attitudinal pathway model, I sought to provide children with a gender schema associated with each item by telling them the item was either "for boys" or "for girls" and matched with a corresponding picture of a gender-congruent boy or a girl holding the item. The data indicate that all children did not readily adopt this schema into their stereotypes (especially gender-aschematic children). Perhaps more salient gender labels and activities to ensure memory to the gender-related information would be necessary to produce a stronger effect. It is also possible that children, particularly gender-aschematic children, attended to the information provided but did not form stereotypes based on the information provided, but instead relied on their own personal interests as the personal pathway model suggests. In addition, research that investigates the role of individual differences in gender schematicity on the pathways outlined in the personal pathway model is needed in future work.

Another limitation of the present studies is that the children ranged in age from 3 to 5 years-old—a prime age for the development of gender stereotypes (Martin and Ruble 2004). However, Liben and Bigler (2002) note that these children may not use logical reasoning when they develop stereotypes—that is, they may not experience dissonance when they claim to have high levels of interest in toys for which they endorse gender-incongruent stereotypes. In addition, a limitation of this age group is that they may indicate high levels of interest in all novel items, as noted by Martin et al. (1995), and may also endorse more egalitarian stereotypes than children in a slightly older age group might (Martin and Ruble 2004). I found that children often constructed specific gender stereotypes about novel toys (e.g., *only for boys* or *only for girls*). However, children also often constructed inclusive gender stereotypes about toys (e.g., *both boys and girls*). Specifically, for most of the toys, over 50 % of children indicated that *both boys and girls* should play with toys. It may be that at this developmental age children may not form stereotypes of toys as *only for boys* or *only for girls* but that they are able to construct stereotypes that are inclusive of boys and girls in the absence of outside information from their environments. It is also possible that children did not know the "correct" answer to the question and thus chose the most inclusive option. In future research, it may be necessary to unpack these constructs by having response options of *only for boys*, *only for girls*, *both boys and girls*, and *I don't know*. In addition, the conditions in which preschool children form egalitarian stereotypes and when they form gender-specific stereotypes are unknown. Further assessment of preschool children's prescriptive gender stereotypes is also needed to determine how this age group applies stereotypes compared to older children and adults. In addition, longitudinal research on these constructs could illustrate age-related changes in children's development and use of gender-related stereotypes and gender-typed interests as well as the progression from the development of interests to stereotypes or stereotypes to interest.

Lastly, the use of novel items allowed for the investigation of the models free of gender-related information from the environment, but it is generally not reflective of the gender-laden environment in which children live. Items were selected that were expected to range in attractiveness, but may be unrepresentative of toys that children encounter in their natural environment. Testing the external validity of the dual pathways models with a variety of toys, objects, occupations, and activities would be ideal.

Gender stereotypes are prevalent among children and adults and are posited to prescribe gender-typed interests in toys, activities, and occupations. The research presented here serves to explore the development of gender stereotypes among young children, specifically by establishing both the role of gender stereotypes in shaping interests (via the *attitudinal pathway model*) and the role of personal interest in the development of gender stereotypes (via the *personal pathway model*). The research presented here is an important addition to constructivist theories of cognitive development, but is also important for scholars, policy workers, and educators who aim to reduce these gender stereotypes and increase interest in cross-gender-typed domains. Individuals with these goals must recognize that there are individual differences in the degree to which children are influenced by given gender stereotypes and that personal interests are also influential in stereotype formation, especially in the absence of given stereotypes.

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