

# Gender-Typed Play and Social Abilities in Boys and Girls: Are They Related?

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**Abstract** In the present study, we tested whether children's play with feminine toys is related to social abilities in which girls typically excel. We measured gender-typed toy play, empathy, and comforting skill in 80 Grade 1 children (about 6 years-old) in Hong Kong, China. Toy play was assessed with a standard observational paradigm; empathy, with the Empathy Quotient-Child Questionnaire; and comforting skill, with an infant-cry paradigm requiring the generation of comforting strategies. As predicted, boys and girls differed in their preferences for play with masculine and feminine toys, but not for gender-neutral toys. Importantly, toy play was related to comforting skill. Girls scored higher on the comforting task, and girls who played more with feminine toys and boys who played more with gender-neutral toys generated more comforting strategies. Regression and mediational analyses also suggested a stronger role of gender-typed play on comforting than the other way round. Contrary to hypothesis, there was no gender difference in empathy, and no relationship between empathy and toy play. These results extend previous understandings of the link between play and development and suggest that early gender-typed experiences may have long-term consequences for the development of some social skills.

**Keywords** Gender differences · Gender-typed play · Toys · Gender socialization · Social skills

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Often gender-typed social skills, including empathy and being able to comfort others, are implicated in adults' interests and involvement as caregivers, including parenting (Blakemore et al. 2009; Hyde 2005), and may be increasingly valued among employers in 21<sup>st</sup> century service-focused labor markets (Deming 2015). Furthermore, exhibiting these social skills in childhood reliably predicts later social relations and academic achievement, at least in U.S. and European samples (Caprara et al. 2000; Eisenberg et al. 2010; Eisenberg and Miller 1987). Thus the purpose of the present study is to explore how young girls' and boys' behaviors, specifically gender-typed play, might influence the development of these social skills of empathy and comforting. We observed toy play in 80 Grade 1 (approximately 6 years-old) girls and boys in Hong Kong, China, a culture that shows gender-typed behaviors and experiences similar to those found in the West (Lee and Collins 2008; Lobel et al. 2000; Yu et al. 2010). Specifically, we examined whether boys and girls who preferred to play with feminine (masculine) toys would show higher (lower) levels of empathy (as reported by parents) and comforting skill (as indicated by the number of comforting strategies generated in response to an infant crying), and whether toy play mediated the relationship between children's gender and their empathy and comforting skills.

## Gender Differences in Empathy and Comforting

Empathy is the intellectual apprehension of another's mental state (cognitive empathy) and an appropriate emotional response to others (affective empathy) (Lawrence et al. 2004). Comforting is an aspect of prosocial behaviors which encompasses voluntary behaviors undertaken with the primary goal of doing good to another person (Burlinson 1982). From an early age, girls appear to be exposed to more opportunities to

develop these skills than are boys. For example, when asking kindergarteners about what happened during the day, U.S. mothers often ask their son what they learned while they asked their daughter about their relationships and emotion-related topics (Flannegan 1996; Flannegan and Perese 1998). Also, studies in the West suggest that girls are assigned more care-taking roles and spend more time taking care of younger siblings (Block 1983; Lytton and Romney 1991).

Consistent with such gendered socialization of social skills, meta-analyses of studies in the West have found that girls and women are generally more empathic than are boys and men across the lifespan (Eisenberg and Fabes 1998; Ickes et al. 2000). A female advantage has also been found in recent studies using self-reports involving adolescents and adults in Britain (Baron-Cohen and Wheelwright 2004; Jolliffe and Farrington 2006; Lawrence et al. 2004) and China (Geng et al. 2012), as well as in parents' reports of British children 4–11 years-old (Auyeung et al. 2009; Chapman et al. 2006) and of Australian primary–secondary school children (Dadds et al. 2008).

Additionally, performance measures of empathy, such as the Reading the Mind in the Eyes test, showed a small female advantage in a meta-analysis of adults from the United Kingdom, United States, Canada, Australia, and several countries from Europe and South America (Kirkland et al. 2013), although there was no gender difference found among British children aged 6–13 years in other studies (Chapman et al. 2006; Sharp 2008). Relatedly, women were better at recognizing and understanding emotions—abilities underlying the cognitive aspect of empathy (Lawrence et al. 2004). Swedish (Allwall et al. 2010), British (Golan et al. 2006), and Japanese (Suzuki et al. 2006) adult women were better at recognizing eye contact and emotional expressions than adult men. Female infants, children, and adults in Western studies also showed a small advantage over their male counterparts in processing facial expressions (McClure 2000).

Children's comforting skills/behaviors have been commonly measured using an infant cry paradigm (Fabes et al. 1994; Zahn-Waxler et al. 1983). Catherine and Schonert-Reichl (2011) showed Grade 1 to 7 Canadian students a photo of an infant crying and asked them to suggest possible comforting strategies. Girls generated more strategies than boys, consistent with other studies reporting a female advantage in comforting behavior in U.S. preschoolers (Fabes et al. 1994) and Grades 1–12 children (Burlison 1982).

### Toy Play: Gender Differences and Outcomes

There is long-standing evidence that boys' and girls' play differs remarkably. For example, boys prefer toy tools, vehicles, blocks, and weapons more than girls do, and girls prefer dolls, toy jewelry, and domestic items more than boys do. These gender differences have been found in infants below

2 years of age as well as in preschoolers and older children using a variety of methods such as observations, parent reports, child interviews, and looking time (Alexander et al. 2009; Golombok et al. 2012; Pasterski et al. 2005; Serbin et al. 2001; Zosuls et al. 2009; for reviews, see Blakemore et al. 2009 and Hines 2010). These gender differences show one of the largest behavioral gender differences ( $d$  as large as 2.00) (Hines 2010), larger than those in television viewing, computer games, and sports in 5–13 year-old U.S. children (Cherney and London 2006).

Play has long been regarded as an important socialization influence on gender development by acting as a medium for children to acquire and practice gendered concepts and behaviors (Cherney and London 2006; Coyle and Liben *in press*). Not all toys are regarded equally, however. For example, a study of U.S. adults' ratings of toys' characteristics found that nurturance is most strongly associated with feminine toys, followed by gender-neutral toys, and least with masculine toys; on the other hand, aggression is most strongly associated with masculine toys (Blakemore and Centers 2005). There is surprisingly scant empirical research on the relationship between gender-typed play and gender-typed abilities (Blakemore and Centers 2005). The available evidence highlights an effect of masculine toys on visual-spatial abilities—abilities that usually show a male advantage across many countries and ages (Linn and Petersen 1985; Voyer et al. 1995). A recent large U.S. study found that school-aged children's preference for masculine toys, such as blocks and manipulative toys, correlates positively with specific visual-spatial abilities, such as dis-embedding and block design (Jirout and Newcombe 2015). Girls' and women's lower visual-spatial ability than males' can therefore be described as resulting from a practice deficit (i.e., insufficient engagement in activities that afford experiences that foster the ability) (Levine et al. 2005).

Although rarely tested, play with feminine toys may also have important implications on social skills (Cherney and London 2006). Results from a handful of studies, most of which may be outdated, that explored the social characteristics of different types of toy play largely paralleled adults' ratings of toys' characteristics (Blakemore and Centers 2005). For example, one study found that dolls, more than trucks or musical instruments, elicited nurturing behavior in U.S. preschool children during play (Liss 1983). Liebenau (1995) studied U.S. preschool girls and found that play with nurturing toys (doctor's kits and stuffed animals) elicited more nurturing behavior than did aggressive toys (toy soldiers and Ninja turtles) or toys that were neither nurturing nor aggressive (puzzles). Caldera and Sciaraffa (1998) found that baby dolls elicited more nurturing and caretaking behavior in 18- to 23-month-old U.S. infants and their parents than did clowns, concluding that feminine toys are unique in their provision of nurturing and caretaking opportunities. In contrast,

masculine toys elicited more aggression in studies of Dutch children aged 4–7 years old (Hellendoorn and Harinck 1997) and U.S. children aged 3–5 years-old (Watson and Peng 1992). Although not tested directly in these studies, these findings suggest that play with different toys could influence social skills outside play. Specifically, aspects of social abilities that show gender differences, such as empathy and caregiving-related skills, may relate positively with feminine toy play and negatively with masculine toy play.

### Gender-Typing in Hong Kong

Although the majority of studies on gender-typing were conducted in the West, many gendered phenomena are apparent in Hong Kong as well, suggesting that findings in Hong Kong would be largely relevant to understanding gender issues in other parts of the world and that Western findings would be relevant to children being socialized in Hong Kong. For example, a comparison of gender-role portrayals found similar patterns of gender stereotypes across Chinese and U.S. television commercials (Cheng 1997). If anything, social norms in Hong Kong may be even stronger than those in the West (Lobel et al. 2000). Teachers in Hong Kong's kindergartens routinely use gender labels, segregate boys and girls, and expect girls to be more cooperative (Chen and Rao 2011). Adolescents and adults in Hong Kong associate men with adjectives such as aggressive, and women with affectionate, sympathetic, and understanding—gender differences that also appear in their self-descriptions (Fung and Ma 2000). Textbooks used in Hong Kong similarly revealed an association between being male and working outside the home, as well as between being female and staying at home and being nurturing (Lee and Collins 2008).

Gender differences in behavior and ability in Chinese samples also resemble those in Western samples. For example, substantial gender differences emerged when parents of Chinese boys and girls reported on the frequency their child engaged in various activities including play with toys—with boys preferring masculine toys (e.g., toy gun, toy tools) and girls preferring feminine toys (e.g., girlish dolls, play house) (Yu et al. 2010). Additionally, Hong Kong primary school and kindergarten children's ratings of toys and objects on masculinity/femininity, and their predictions of other children's activities and interests, largely resemble findings in the West (e.g., boys want toy guns, and girls want to become nurses) (Lobel et al. 2000). Social skills also show a female advantage among Chinese children. For example, there is a female advantage in self-reported empathy among Chinese primary and secondary school students; this empathy is also positively correlated with prosocial behavior (Geng et al. 2012), a finding

also documented by research in the West (Eisenberg and Miller 1987; Eisenberg et al. 2010).

### The Present Study

We propose five sets of hypotheses based on our conclusions that children's toy preferences, both in the West and in Hong Kong, are gender-typed and affect children's developing skills and that gender differences are evident in children's social skills, specifically those skills focused on empathy and comforting. Our first hypothesis was that boys would prefer to play with masculine toys (Hypothesis 1a) and girls would prefer to play with feminine toys (Hypothesis 1b) more than did their other-sex counterparts, as well as that play with gender-neutral toys would be equally preferred by boys and girls (Prediction 1c). Our second hypothesis was that girls would score higher on parent-evaluated empathy (Hypothesis 2a) and generate more comforting strategies in response to an infant-cry scenario (Hypothesis 2b) than boys.

Our third central hypothesis was that greater preference to play with feminine toys would correlate with better empathy and comforting skills (Hypothesis 3a) and that greater preference to play with masculine toys would correlate with lower empathy and comforting skill (Hypothesis 3b), in both boys and girls. Furthermore, because gender-neutral play is a substitute for other types of play, we hypothesized that a preference for play with gender-neutral toys would correlate with higher levels of empathy and comforting skill in boys (Hypothesis 3c), but with lower levels of these abilities in girls (Hypothesis 3d).

Due to our cross-sectional design and potential questions about reverse causality, we also compared the  $\beta$  weights in two sets of hypothesized regression models as a further test of the simple relationships between toy play and social skills. The first set hypothesized that masculine and feminine toy play would predict empathy and comforting skills independent of an effect of gender (Hypothesis 4a), and the second set hypothesized that empathy and comforting skills would predict masculine and feminine toy play independent of an effect of gender (Hypothesis 4b).

Our final central hypothesis was that gender-typed toy play would explain gender differences in social abilities. We hypothesized that gender-typed toy play would mediate the relationship between a child's gender and that child's empathy and comforting skills such that gender would predict these skills by influencing masculine and feminine toy play (Hypothesis 5a). We also tested the alternative hypothesis that empathy and comforting skill would mediate the relationship between gender and toy play such that gender would predict masculine and feminine toy play by influencing social abilities (Hypothesis 5b).

## Method

### Participants, Procedure, and Materials

Study participants were 80 Grade 1 students of Chinese ethnicity recruited from a primary school in Hong Kong. Two boys and one girl had outlier values above 1.5 inter-quartile range of the third quartile on the comforting task, and one girl had outlier value below 1.5 inter-quartile range of the first quartile on the empathy measure. These children were excluded from analyses. Of the remaining 76 students ( $M_{\text{age}}=70$  months [5.83 years-old],  $SD=4.07$ ), there were 38 boys ( $M_{\text{age}}=77$  months,  $SD=4.44$ , range = 70–88 months) and 38 girls ( $M_{\text{age}}=77$  months,  $SD=3.71$ , range = 70–84 months). Parents completed a questionnaire on demographic characteristics and their child's empathy. For the infant-cry task and toy play, each child was tested individually in a quiet room at the school. Monthly family income of the usable sample was diverse, ranging from  $\leq$ HKD5,999 to  $\geq$ HKD60,000, with 6.6 % of the families earning the city's average family income (HKD20,000 to 24,999) and with 60.6 % earning below and 32.8 % earning above this city's average. Almost all parents reported having completed high school, college, or postgraduate school. To ensure sensitivity to gender variations, we have chosen measures that have previously shown gender differences at the targets' age.

#### Toy Play

Toy play was assessed using a standardized observational paradigm (see Pasterski et al. 2005). Five masculine toys (Lego, a toy car, a fire truck, a toy gun, and a tool set), five feminine toys (a rag doll, a baby doll, a make-up set, a Barbie doll, and a dish set), and five gender-neutral toys (a puzzle, a toy cash register, a sketchpad with crayons, a book, and a chess set) were selected because they showed gender differences (or a lack of it) in previous research (Berenbaum and Hines 1992; Pasterski et al. 2005). The toys were placed in a semi-circle, with no toy in the same category placed next to each other; the layout was rearranged after individually testing 10 children. The researcher instructed the children that they could play with whichever toy(s) and in whatever manner they chose. Each play session lasted eight minutes and was videotaped.

The first six minutes of score-able footage was coded for the number of seconds the child played with each toy. Play was defined in accordance with past research as purposeful interaction with a toy with interest, either with or without physical contact (Berenbaum and Hines 1992; Pasterski et al. 2005; Servin et al. 1999; Zosuls et al. 2009). Behaviors such as accidentally touching a toy or picking up a toy only to put it away were not counted as play. The total number of seconds each

child spent with toys of the same category (masculine, feminine, or gender-neutral) was divided by 360 seconds and then multiplied by 100 so as to derive the percentage of time during which that child spent with toys in that particular category out of total play time. If two or more toys were played with simultaneously, each toy was coded separately. The first author coded all the videos, and a psychology student unaware of the study's hypotheses coded 30 % of the videos (24 videos, totaling 144 min being cross-coded). The single-rater ICCs were 0.99 for masculine toys, 1.00 for feminine toys, and 1.00 for gender-neutral toys, with all  $ps < .001$ .

#### Empathy

Empathy was measured by the child version of the Empathy Quotient (EQ-C; Auyeung et al. 2009), which assesses broad aspects of empathy and yields an overall empathy score. The Chinese version (translated by Meng-Chuan Lai and Chien-Gwo Chang; back translation verified by Bonnie Auyeung, Autism Research Centre, University of Cambridge) was taken from the website of the Autism Research Centre (2015). Parents indicated on a 4-point scale their agreement/ disagreement with 27 items (e.g., "My child gets upset at seeing others crying or in pain": "我的小孩看見別人哭或是受苦會難過"). Non-empathic responses, whatever the magnitude (e.g., slightly disagree or definitely disagree on the sample item) were scored 0 point; empathic responses, depending on the magnitude (e.g., slightly agree or definitely agree on the sample item) were scored 1 or 2 points, so the possible final scores ranged from 0 to 54 (Auyeung et al. 2009; Lawrence et al. 2004), and a higher score represented more empathy. The EQ-C showed good test-retest reliability over a 6-month period ( $ICC=0.84$ ) and sound internal consistency in a prior study ( $\alpha=.93$ ) (Auyeung et al. 2009) as well as good internal consistency in our sample ( $\alpha=.76$ ).

Construct validity and a female advantage have been reported for the EQ. For example, it differentiates healthy adults from adults with autism, as well as women from men among healthy adults in Britain ( $d=.50$ , Baron-Cohen and Wheelwright 2004;  $d=.96$ , Lawrence et al. 2004). The EQ-C also showed a female advantage in healthy British children aged 4–11 years-old ( $d=.56-.76$ ) (Auyeung et al. 2009; Chapman et al. 2006). Cross-culturally, the EQ-C showed a female advantage in Asian samples including Japanese children 6–15 years-old ( $d=.46$ , Wakabayashi 2013).

#### Comforting Strategies

Instead of showing a photo of a crying infant (Catherine and Schonert-Reichl 2011), a video was presented with a cover story to increase realism. The infant's gender was purposefully ambiguous, with it appearing in gender-neutral clothing and hairstyle. The researcher first played

a 20-s video on a laptop computer of the infant sleeping, and she explained that the infant was her baby whom she was monitoring using a baby monitor. Meanwhile, the researcher made standardized comments about the infant to ensure that the children attended to it (e.g., “Is the baby sleeping?”; “Can you see her lips twitching?”). No child questioned the validity of the video. The researcher then suggested that the child play with the toys, after which the researcher played a 30-s video of the infant crying. The researcher asked, “The baby is crying. What can be done to make the baby more comfortable or happier, so it will stop crying?” Following each strategy provided by the child, the researcher prompted for further strategies using standardized language (e.g., “If the baby keeps crying, what would you do?”). The task ended when the child indicated that s/he had no more ideas twice consecutively. This exchange was audio-recorded.

Following Catherine and Schonert-Reichl (2011), strategies were coded as caregiving (e.g., feed/comfort it) or entertaining (e.g., sing to/ play with it). (There was no instance of a strategy not belonging to one of these types of strategies.) Strategies were counted as being different so long as they were not identical (e.g., “feeding” and “feeding with milk” were two different strategies). The final scores were the number of caregiving strategies, the number of entertainment strategies, and the total number of all strategies. The first author coded all the strategies, and a psychology student unaware of the hypotheses coded the strategies of 30 % of the children. The single-rater ICCs for caregiving and entertainment strategies were .98 and .99, respectively,  $p$ s < .001.

## Results

### Preliminary Analyses

A MANOVA showed no gender differences in family income or age, and these variables did not correlate significantly with EQ-C scores or comforting strategies. Boys ( $M = .16$ ,  $SD = .37$ ) had fewer younger siblings than girls ( $M = .42$ ,  $SD = .50$ ),  $F(1, 74) = 6.80$ ,  $p = .011$ , but the number of younger siblings did not correlate with EQ-C scores or comforting strategies. Data from boys and girls were analyzed separately in some analyses because patterns may differ by gender. We first present results from a one-way MANOVA to test whether the study variables showed predicted patterns, and then we present results from correlation and regression analyses testing the simple relationships between toy play and social skills. Finally, we report results from mediation analyses testing whether gender-typed toy play explains gender differences in social skills.

## Hypothesis Testing

### Toy Play

We hypothesized that boys would prefer to play with masculine toys more than did girls (Hypothesis 1a), girls would prefer to play with feminine toys more than did boys (Hypothesis 1b), and that gender-neutral toys would show no gender difference (Prediction 1c). As hypothesized, boys ( $M = 59.64$ ,  $SD = 36.74$ ) spent more time playing with masculine toys than did girls ( $M = 12.05$ ,  $SD = 23.83$ ),  $F(1, 74) = 44.87$ ,  $p < .001$ ,  $d = 1.54$ . As expected, girls ( $M = 50.91$ ,  $SD = 32.64$ ) spent more time playing with feminine toys than did boys ( $M = 7.49$ ,  $SD = 17.36$ ),  $F(1, 74) = 52.44$ ,  $p < .001$ ,  $d = -1.68$ . Boys ( $M = 32.88$ ,  $SD = 33.41$ ) and girls ( $M = 37.04$ ,  $SD = 30.47$ ) did not differ significantly on their time spent playing with gender-neutral toys,  $F(1, 74) = 0.32$ ,  $p = .572$ ,  $d = -.13$ . Thus all three predictions subsumed under our first hypothesis were supported, showing expected gender-typing in children’s play patterns.

### Empathy and Comforting

We hypothesized that girls would score higher than boys on both empathy (Hypothesis 2a) and comforting (Hypothesis 2b). Contrary to expectations for empathy, there was no gender difference in boys’ ( $M = 33.95$ ,  $SD = 6.49$ ) and girls’ ( $M = 33.66$ ,  $SD = 7.18$ ) EQ-C scores,  $F(1, 74) = 0.03$ ,  $p = .854$ ,  $d = .04$ . Although boys ( $M = 2.00$ ,  $SD = 2.08$ ) generated as many caregiving strategies to comfort the videotaped crying baby as did girls ( $M = 2.61$ ,  $SD = 1.55$ ),  $F(1, 74) = 2.07$ ,  $p = .155$ ,  $d = .33$ , girls ( $M = 1.63$ ,  $SD = 1.46$ ) offered more entertainment strategies than did boys ( $M = .97$ ,  $SD = 1.20$ ),  $F(1, 74) = 4.62$ ,  $p = .035$ ,  $d = .49$ , and the total number of strategies offered overall by girls ( $M = 4.24$ ,  $SD = 2.20$ ) and boys ( $M = 2.97$ ,  $SD = 2.70$ ) differed significantly,  $F(1, 74) = 5.01$ ,  $p = .028$ ,  $d = .52$ . Thus our findings provided partial support for Hypothesis 2b focused on children’s comforting skills but no support for Hypothesis 2a focused on empathy.

### Toy Play and Social Skills

There was partial support for our third set of hypotheses (see Table 1). Contrary to our predictions, both feminine (Hypothesis 3a) and masculine (Hypothesis 3b) toy play were unrelated to children’s EQ-C empathy scores for both boys and girls. As for comforting strategies, Hypothesis 3a and Hypothesis 3b received some support. However, although we expected toy play to be related to comforting in similar ways in boys and girls, found relationships were gender-specific. Feminine toy play was significantly and positively related to generating more comforting strategies (total, as well as when broken down in to caregiving and entertainment

**Table 1** Spearman's correlations between toy play, empathy, and comforting strategies

		Boys ( <i>df</i> =36)	Girls ( <i>df</i> =36)
EQ-C (Empathy Quotient-Child)			
Masculine toy play		$r = -.19, p = .258$	$r = -.21, p = .206$
Feminine toy play		$r = .26, p = .112$	$r = -.08, p = .648$
Gender-neutral toy play		$r = .05, p = .749$	$r = .24, p = .140$
Comforting Strategies			
Masculine toy play	Total	$r = -.32, p = .053$	$r = -.03, p = .842$
	Caregiving	$r = -.24, p = .140$	$r = -.26, p = .110$
	Entertainment	$r = -.25, p = .136$	$r = .24, p = .154$
Feminine toy play	Total	$r = .10, p = .548$	$r = .43, p = .008^*$
	Caregiving	$r = .14, p = .416$	$r = .33, p = .046^*$
	Entertainment	$r = -.07, p = .689$	$r = .33, p = .044^*$
Gender-neutral toy play	Total	$r = .34, p = .039^*$	$r = -.24, p = .153$
	Caregiving	$r = .27, p = .103$	$r = -.05, p = .762$
	Entertainment	$r = .25, p = .128$	$r = -.38, p = .017^*$

strategies), but only among girls. Similarly, masculine toy play was associated with lower overall comforting only among boys and only marginally ( $p = .053$ ). As for gender-neutral play, again no relationships were found for empathy. In support of Hypothesis 3c, the more boys played with gender-neutral toys, the more overall comforting strategies they offered. For girls, gender-neutral play was linked to comforting, but only for entertainment forms of comforting, thus providing limited support for Hypothesis 3d.

#### Further Tests Using Multiple Regression

Due to the correlational nature of our data, we tested the relationship between gender-typed toy play and comforting skill found in the correlational analyses. We ran one set of six bootstrapped multiple regression models with gender and masculine or feminine toy play as predictors of each type of comforting strategy, testing Hypothesis 4a. We then compared these results with an alternative set of regression analyses which used gender and each type of comforting strategy as predictors of masculine or feminine toy play (Hypothesis 4b). The comparisons focused on the bias-corrected bootstrapped standardized beta coefficients, which indicate the independent effect of the toy play variable (in the first set of models) or the comforting strategy variable (in the alternative models) not confounded by gender.

Consistent with Hypothesis 4a, the first set of regression models showed that masculine and feminine toy play predicted comforting skill independent of an effect of gender. For masculine toy play, the coefficients were  $\beta = -.364, SE = .16, p = .030, 95\% \text{ CI} [-.675, -.018]$ ,  $\beta = -.425, SE = .16, p = .011, 95\% \text{ CI} [-.777, -.084]$ , and  $\beta = -.093, SE = .16, p = .135, 95\% \text{ CI} [-.344, .211]$  for total strategies, caregiving strategies, and entertainment strategies, respectively. For

feminine toy play, these coefficients were  $\beta = .353, SE = .15, p = .023, 95\% \text{ CI} [.072, .654]$ ,  $\beta = .277, SE = .16, p = .067, 95\% \text{ CI} [-.026, .656]$ , and  $\beta = .256, SE = .12, p = .032, 95\% \text{ CI} [.051, .476]$  for total strategies, caregiving strategies, and entertainment strategies, respectively.

Consistent with Hypothesis 4b, the second set of regression models showed that comforting skill also predicted masculine and feminine toy play independent of an effect of gender. For masculine toy play (as an outcome), the coefficients were  $\beta = -.235, SE = .11, p = .041, 95\% \text{ CI} [-.457, -.018]$ ,  $\beta = -.280, SE = .10, p = .005, 95\% \text{ CI} [-.465, -.059]$ , and  $\beta = -.052, SE = .09, p = .541, 95\% \text{ CI} [-.269, .109]$  for total strategies, caregiving strategies, and entertainment strategies, respectively. For feminine toy play (as an outcome), the coefficients were  $\beta = .217, SE = .09, p = .018, 95\% \text{ CI} [.054, .416]$ ,  $\beta = .177, SE = .08, p = .033, 95\% \text{ CI} [.007, .334]$ , and  $\beta = .151, SE = .09, p = .073, 95\% \text{ CI} [.003, .359]$  for total strategies, caregiving strategies, and entertainment strategies, respectively.

However, the second set of regression analyses showed generally smaller  $\beta$  coefficients than the first set. The differences translate into a 34 to 44 % (mean = 38 %) reduction of the standardized coefficient when changing the role of gender-typed play from being a predictor of comforting skill to the reverse. Therefore, the regression analyses suggested a possible bi-directional effect between gender-typed toy play and comforting skills, but the support was relatively stronger for Hypothesis 4a (that gender-typed toy play would predict comforting skill) than for Hypothesis 4b (that comforting skill would predict gender-typed toy play).

#### Hypothesized Mediation

Our final question concerns whether gender differences in toy play could explain gender differences in social skills. We did

not conduct these analyses for the EQ-C because it showed no predicted gender difference nor correlated with comforting skill or toy play. We used bootstrapping (1000 samples) using PROCESS (Hayes 2013), which improves estimates, accepts non-normality, and offers a direct test of the mediation effect without interference from effects of individual relationships among the predictor, the outcome, and the mediator (Hayes 2009, 2013). First, we ran mediation analyses with the following hypothesized relationship—gender as the predictor, the total number of comforting strategies as the outcome, and toy play as the mediator. Given the established gender difference in total comforting strategies, three mediation analyses focused on predicting the total number of comforting strategies for each type of toy play (masculine, feminine, and gender-neutral). Results are reported in the terminology of a total effect (equivalent to the gender difference in comforting skill), direct effect (effect of the predictor on the outcome while controlling for the effect of the mediator), and indirect effect (effect of the predictor on the outcome through the mediator). Finding indirect effects of gender on comforting strategies through gender-typed toy play would strengthen the hypothesis that gender-typed toy play contributes to the gender difference in comforting skill.

Gender had no direct effect when masculine (direct effect = .162,  $SE = .69$ ,  $t = .234$ ,  $p = .815$ ) or feminine (direct effect = .128,  $SE = .71$ ,  $t = .179$ ,  $p = .858$ ) toy play was entered as a mediator. Rather, gender had an indirect effect through masculine (indirect effect = 1.102,  $SE = .50$ , 95 % CI [.184, 2.138]) and feminine (indirect effect = 1.136,  $SE = .52$ , 95 % CI [.191, 2.198]) toy play. In contrast, when gender-neutral toy play was entered as a mediator, there was a direct effect of gender (direct effect = 1.246,  $SE = .57$ ,  $t = 2.191$ ,  $p = .032$ ) and no indirect effect (indirect effect = .018,  $SE = .09$ , 95 % CI [-.100, .316]). In other words, the gender difference in comforting skill was accounted for by gender-typed play. When including masculine or feminine toy play as the mediator, the direct effect of gender was not significant, suggesting the possibility that boys and girls differ in their comforting skill partly because they play with different toys, thus supporting Hypothesis 5a.

#### *Alternative Mediation*

Again, due to the correlational nature of our data, we reversed the hypothesized roles of play and comforting skill in the mediation analyses. That is, we tested the alternative hypothesis (Hypothesis 5b) that boys and girls differ in comforting skill and therefore they prefer to play with different toys. We ran three alternative mediation analyses with each type of toy play as the outcome and total comforting strategies as the mediator. These alternative mediation models showed only nonsignificant or marginally significant indirect effects. Specifically, when masculine toy play was entered as an

outcome, there was a direct effect (direct effect = -.430,  $SE = .07$ ,  $t = 6.076$ ,  $p < .001$ ) and almost no indirect effect (indirect effect = -.046,  $SE = .03$ , 95 % CI [-.135, -.002]). When feminine toy play was entered as an outcome, there also was a direct effect (direct effect = .397,  $SE = .06$ ,  $t = 6.624$ ,  $p < .001$ ) and almost no indirect effect (indirect effect = .037,  $SE = .03$ , 95 % CI [.005, .111]). When gender-neutral toy play was entered as an outcome, there was no direct effect (direct effect = .033,  $SE = .08$ ,  $t = 428$ ,  $p = .670$ ) or indirect effect (indirect effect = .009,  $SE = .03$ , 95 % CI [-.033, .0775]). These results suggest the possibility that although boys and girls do prefer to play with different toys, they do not do so because they differ in comforting skill.

## Discussion

We investigated the implication of gender-typed toy play on empathy and the ability to generate comforting strategies in Hong Kong Chinese children. Consistent with Hypothesis 1, boys preferred playing with masculine toys and girls preferred playing with feminine toys more than their other-sex peers did, and they equally preferred playing with gender-neutral toys. These findings resemble observed preferences in North American and European infants and school-aged children (Berenbaum and Hines 1992; Pasterski et al. 2005; Serbin et al. 2001; Servin et al. 1999; Zosuls et al. 2009) and parent-reported preferences in Chinese children (Yu et al. 2010), suggesting that gender-typed play is a prevalent, cross-cultural, phenomenon. Consistent with Hypothesis 2b and findings in Catherine and Schonert-Reichl (2011), we also found that girls generated more comforting strategies. Importantly, comforting skill was related to toy choices, with results suggesting that gender-typed play had a stronger role on comforting skill than the other way round. Gender also had an indirect effect on comforting skill through gender-typed toy play. These results provide some support for the socialization perspective, substantiating the long-held hypothesis that feminine toys, as well as masculine toys, contribute to gendered developmental outcomes (Block 1983; Caldera et al. 1989; Cherney and London 2006; Levine et al. 2005).

### Comforting Strategies and Toy Play

Notably, in support of Hypothesis 3, more feminine toy play consistently was associated with more total comforting, as well as specifically caregiving and entertainment comforting, strategies by girls. The effect sizes were large by Cohen's (1988) standard. More masculine toy play was related to fewer total comforting strategies by boys, although only marginally significantly so and not specifically to either type of comforting strategy. The correlations were stronger when analyzing total strategies instead of individual types of strategies,

perhaps because composite measures combining individual measures are more statistically reliable and accurate than each of the individual measures (Campbell and Fiske 1959).

We found stronger support for the role of gender-typed toy play on social abilities (Hypothesis 4a and Hypothesis 5a) than for the role of social abilities on gender-typed toy play (alternative Hypothesis 4b and Hypothesis 5b). Regression analyses showed that gender-typed toy play predicted comforting skill more strongly than comforting skill predicted gender-typed toy play. Additionally, in the mediation analyses, masculine and feminine toy play mediated the effect of gender on comforting strategies. When controlling for masculine or feminine toy play, the direct effect of gender became nonsignificant. These findings suggest that the gender difference in generating comforting strategies is due, in part, to gender-typed toy play, although with some cautions. Complete mediation may be inferred when an indirect effect renders a direct effect nonsignificant. However, some researchers caution against the concept of partial versus complete mediation (Hayes 2013). The results of the mediation suggest a role of gender-typed toy play on the gender difference in comforting skill without eliminating other possible factors. The alternative mediation model that reversed the hypothesized relationship suggested that comforting skill did not mediate the gender effect on toy play. The correlational nature of the study certainly could not affirm the direction of relationships. However, comparisons of the alternative regression and mediation models suggested that, at least statistically speaking, an effect of play on comforting skill offered a more credible explanation to the correlations between the two variables.

Feminine toy play may train comforting skills because this kind of play often involves the mimicry of harmonious interactions and taking care of and “playing nice” with others (Maccoby 1998, p.42). Both play with feminine toys (e.g., baby dolls) and generating comforting strategies are about generating ideas for pro-social interaction. In contrast, masculine toy play often encourages competition and aggression (Blakemore and Centers 2005; Hellendoorn and Harinck 1997; Watson and Peng 1992). Children who engage frequently in masculine toy play may thus have fewer opportunities to develop the motivation and skills to comfort another.

Interestingly, the relationship between gender-typed toy play and social skills was gender-specific. None of the correlations with feminine toy play was significant in boys. Perhaps when boys play with feminine toys, they play with a weaker element of nurturance than do girls. For example, during doll play, boys exhibit more negative affect and aggression than girls (Liss 1983). When given logs, female more often than male chimpanzees use them as dolls, playing with and cuddling them (Kahlenberg and Wrangham 2010). Play with the same toys may therefore have different effects on boys and girls. Alternatively, the lack of a correlation between feminine

toy play and boys’ comforting strategies could be due to boys’ low frequency and variance in play with feminine toys (averaging at 7 % of their play, with some not playing with them at all). Even if boys play with feminine toys in the same nurturing way as girls, larger amounts of feminine toy play may be required for it to have an effect. In so far as masculine toys can improve girls’ spatial skills (Jirout and Newcombe 2015), it is reasonable to speculate that boys would benefit from play with feminine toys if given sufficient exposure, despite potential gender differences in play with the same objects.

Because children can choose gender-neutral toys as a replacement for gender-typed toys, a preference for play with gender-neutral toys may correlate with social abilities negatively in girls and positively in boys. The correlations with comforting strategies were not as strong for gender-neutral toy play as for feminine toy play. However, it is noteworthy that it correlated positively with boys’ comforting strategies, challenging the perception that only feminine toys provide opportunities for nurturance (Caldera and Sciaraffa 1998). Conceivably, some gender-neutral toys, such as stuffed animals, can elicit nurturing behavior. U.S. adults also associate nurturance with gender-neutral toys more than masculine toys (Blakemore and Centers 2005). Boys who prefer gender-neutral toys may thus be exposed to more nurturing activities and less aggressive/ non-nurturing activities than boys who prefer masculine toys. Another possibility, which may co-exist with an effect of toy play on comforting skills, is that boys with high comforting skills may self-select to play with gender-neutral toys. Boys who prefer gender-neutral toys may be those who feel less bound by stereotypical demands of masculinity and are therefore more nurturing and prosocial (Doescher and Sugawara 1990).

#### Empathy and Toy Play

Contrary to Hypothesis 2a, we found no gender difference on the EQ-C. Although the EQ and EQ-C showed construct validity and gender differences in adults and children in different countries (Auyeung et al. 2009; Baron-Cohen and Wheelwright 2004; Chapman et al. 2006; Lawrence et al. 2004; Wakabayashi 2013), they sometimes showed no gender difference in Asian adults (Guan et al. 2012; Kim and Lee 2010) and in Korean children (Park et al. 2012). A recent review by the scale developers concluded that, at least for the self-report version, the EQ is less stable and less sensitive to gender differences in Asian countries (Groen et al. 2015). Psychometric studies of British adults suggest that emotional reactivity (i.e., the tendency to convey one’s emotions) drives a large part of the gender difference on the EQ (Lawrence et al. 2004; Muncer and Ling 2006). Asian mothers, more so than Western mothers, require their children to suppress their emotions (Lin and Fu 1990; Louie et al. 2013), and Asian children show less sadness and exuberance than Western children

(Louie et al. 2013). Therefore, low emotional reactivity may conceal the gender difference in parent-reported empathy in some Asian studies, including ours. Alternatively, we might have found a gender difference if older children were included because studies that found a gender difference in the EQ-C typically included wider age ranges (up to age 15 years) (Auyeung et al. 2009; Chapman et al. 2006; Wakabayashi 2013). Contrary to Hypothesis 3, we found no significant correlation between the EQ-C and toy play. This finding suggests that play with gender-typed toys does not affect empathic development. However, because the EQ-C did not show the expected gender difference, the lack of a correlation with toy play may not be surprising and cannot be interpreted confidently.

### Limitations and Future Research Directions

Gender-typed toy play correlated with comforting strategies, and it mediated the effect of gender on comforting skill. These results are consistent with the hypothesis that feminine toy play contributes to at least some social abilities and that gender differences in some social abilities are in part caused by gender differences in toy play. Alternative regression and mediation analyses suggested that gender-typed toy play has a statistically stronger role on variations in comforting skill than the other way round. However, the correlational nature of the study cannot ascertain the causal mechanism. Social abilities and gender-typed toy play likely reinforce each other. Nevertheless, finding consistent correlations is a necessary precondition to concluding play as a causal agent (Lillard et al. 2013) and could thus inform the plausibility of an effect of gender-typed toy play. Longitudinal and experimental studies can further address the causal relationships between toy play and social abilities, for example, by conducting play sessions using designated toys in a school setting, analogous to earlier experimental studies on spatial abilities (Connor et al. 1978; Denier and Serbin 1978; Sprafkin et al. 1983). With the advent of technology, it would also be interesting to investigate the effect of simulated feminine games played on computer devices.

Although the correlations between toy play and comforting strategies involved multiple tests, Bonferroni adjustments were not applied because they are suited for *a posteriori* testing and the decision on how to apply them is not always straightforward (Perneger 1998). Some researchers advise discussing multiple comparisons and not to apply corrections when analyzing results (Rothman 1990). Considering all the correlations between toy play and comforting strategies together, the number of significant correlations (five) was larger than the number of significant correlations that would be expected from 5 % chance level (0.9), suggesting that our findings cannot be attributed to chance alone.

We chose all measures based on their sensitivity to gender differences in our sample's age group in previous research. However, the EQ-C did not show the predicted gender difference, despite showing one in several studies of Western children (Auyeung et al. 2009; Chapman et al. 2006) and a study of Asian children (Wakabayashi 2013), thus limiting our subsequent analyses involving this measure. Another study of Chinese children around the age of our participants had found a female advantage using other measures of empathy (Geng et al. 2012). Future studies need to validate the EQ and the EQ-C in Asian samples to address the potential issue of low emotional expressivity or use additional measures of empathy.

Our comforting measure showed the predicted gender difference and correlations with play, but one caveat is that it measures a specific aspect of comforting skills, knowledge of comforting strategies, and not comforting behavior. Additionally, although we attempted to make the paradigm gender-neutral by presenting an infant in gender-neutral appearance, the paradigm itself could be gender-biased because girls are more interested in infants (Maestriperieri and Pelka 2002). Tests of comforting skills in more diverse situations may consolidate our findings.

### Practice Implications

The current findings have policy implications for interventions aiming at improving children's social skills. Such interventions can matter because childhood social skills predict later life outcomes, including school achievement and social relationships (Caprara et al. 2000; Eisenberg and Miller 1987; Eisenberg et al. 2010). It has been suggested that inferior performance of boys and girls in certain abilities compared with the other gender may in part be the result of insufficient experience of engaging in activities that offer suitable practice. For young children, the most likely and enjoyable source of practice may be play with toys. As a result, researchers and educators have attempted to narrow gender gaps in development in spatial abilities by encouraging masculine toy play (Casey et al. 2008). Our findings suggest that feminine toy play may also benefit children by helping them develop some social skills. Although it may be difficult to encourage children to play with cross-gender toys because children, especially boys, tend to fixate on gender-typed play and avoid cross-gender activities (Green et al. 2004), recent studies suggest that this cross-over is possible. For example, perceptual features, especially color, are the most frequently used reasons underlying children's perception of the gender assignment of otherwise gender-neutral toys (Cherney and Dempsey 2010), and experimental studies in the United States and Britain have shown that preschool children's actual toy preferences can be changed by manipulating these features (Weisgram et al. 2014; Wong and Hines 2015). Alternatively, our finding of a correlation between boys' gender-neutral toy play and

comforting skill suggests that encouraging boys to play with gender-neutral toys may also be worthwhile.

## Conclusion

Our study is the first known to test relationships between gender-typed toy play and social development in Hong Kong Chinese children. Results showed a clear relationship between comforting skill and feminine toy play in girls and a significant relationship with gender-neutral toy play in boys. Both masculine and feminine toy play mediated the effect of gender on comforting skill. Comparing hypothesized and alternative regression and mediation models, the effect of gender-typed play on comforting skill was stronger than that of comforting skill on gender-typed toy play. These findings are in agreement with socialization theories that stress how deficits in practice contribute to deficits in abilities (Baenninger and Newcombe 1989; Block 1983; Caldera et al. 1989; Jirout and Newcombe 2015; Levine et al. 2005). They corroborate previous findings relating gender-typed toy play and spatial skills, which show a male advantage, by showing that gender-typed toy play also relates to some social skills, which show a female advantage. Because correlations are a prerequisite for showing causal relationships, such findings add evidence to the importance of play on development and call for longitudinal and experimental studies on the consequences of different types of play (Lillard et al. 2013).

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