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Brief report

Pretty in pink: The early development of gender-stereotyped colour preferences

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Parents commonly dress their baby girls in pink and their baby boys in blue. Although there is research showing that children prefer the colour blue to other colours (regardless of gender), there is no evidence that girls actually have a special preference for the colour pink. This is the focus of the current investigation. In a large cross-sectional study, children aged 7 months to 5 years were offered eight pairs of objects and asked to choose one. In every pair, one of the objects was always pink. By the age of 2, girls chose pink objects more often than boys did, and by the age of 2.5, they had a significant preference for the colour pink over other colours. At the same time, boys showed an increasing *avoidance* of pink. These results thus reveal that sex differences in young children's preference for the colour pink involves both an increasing attraction to pink by young girls and a growing avoidance of pink by boys.

'Dear Abby:

My daughter recently had a baby boy. Mother and baby are doing fine, but the problem is the sonogram during the pregnancy showed a baby girl . . . So now our grandson has a slew of pink blankets, jimmies and clothes given by friends before little Jack was born. I say, no big deal. My wife says it is a big deal. No way a boy should be dressed in pink . . . '

—Jack's Grandpa, April 2, 2007[1]

Girls like pink, boys like blue

Imagine walking into any newborn infant's room: you could almost certainly guess the gender of the baby just from the colour of his or her clothes, blankets, and toys. Any infant surrounded by pink items is virtually certain to be a girl, whereas a child immersed in blue is very likely to be a boy. This colour differentiation is not limited to newborns. Advertisements in catalogs and newspapers feature little girls dressed in pink clothes, playing with pink toys, carrying pink lunchboxes, typing on pink computers, and so on. In contrast, little boys are typically portrayed with clothing and toys that are blue.

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The social convention of dressing young children in gender-specific colours was first documented in the United States in the early 1920s (Chiu *et al.*, 2006). More recently, observations of parents and their infants at suburban shopping malls revealed that 75% of infant girls were wearing pink, whereas 79% of infant boys were in blue (Shakin, Shakin, & Sternglanz, 1985). Children are aware of this differential dressing pattern quite early on: by the time they enter preschool, they make decisions about gender identity based on colour. For example, Picariello, Greenberg, and Pillemer (1990) presented preschool children with toy animals that were identical except for colour and asked them to identify the gender of the toys. The children identified the animals in accordance with gender-based stereotypes, labelling pink and purple animals as 'girls' and blue or brown ones as 'boys'.

It is thus clear, both from everyday observation and from research results, that both adults and young children are aware that pink is for girls and blue is for boys. However, do little girls actually *prefer* pink? Do young boys actually *like* blue? Studies of young children's colour preferences date back to the early 1900s, but none report gender differences (Garth, 1924; Garth & Collado, 1929; Gesche, 1927; Hurlock, 1927; Katz & Breed, 1922; Krishna, 1972; McManus, Jones, & Cottrell, 1981; Saito, 1996). In fact, most studies with preschool children in the United States have reported a preference for primary colours on the part of *both* boys and girls. Several studies have demonstrated that both infants and preschool children prefer primary colours (such as red and blue) to secondary colours (such as pink and orange) (Franklin *et al.*, 2008; Pitchford & Mullen, 2005; Zentner, 2001). Others have shown that preschool-aged boys and girls prefer red to all other colours (Zentner, 2001). Similar preferences for red have also been reported for infants (Franklin, Bevis, Ling, & Hurlbert, 2010; Franklin *et al.*, 2008; Jadva, Hines, & Golombok, 2010). Conversely, other studies have shown that newborn infants, rhesus monkeys, and even pigeons prefer blue to any other colour (Bornstein, 1975; Humphrey, 1972; Sahgal & Iverson, 1975; Sahgal, Pratt, & Iverson, 1975; Teller, Civan, & Bronson-Castain, 2004; Zemach, Chang, & Teller, 2007).

There is one recent study that suggests that children do prefer gender-stereotyped colours. Chiu *et al.* (2006) compared colour preferences in 3- to 12-year-old children with and without gender identity disorder (GID). They asked both groups of children to identify three of their favourite colours by naming or pointing to them on a chart. Within the control group, girls chose pink/purple significantly more often than boys did. However, boys and girls with GID did the opposite: boys with GID chose pink/purple significantly more often than girls with GID. This research suggests that children choose colours based on which colour is associated with the gender with which they most identify.

Gender-stereotyped preferences

For decades, researchers have been studying how children develop gender-stereotyped behaviour, such as preferences for pink or blue. Some have suggested, for example, that since gender-stereotyped colour dressing is so common in infancy, infants develop a preference for these familiar colours as they grow older (Chiu *et al.*, 2006; Cohen, 2004). Researchers have shown that male and female infants as young as 5 months of age become familiar with vastly different surroundings: while female infants were often dressed in pink, had pink pacifiers, and yellow bedding, boys were more likely to have blue bedding and curtains in their rooms (Pomerleau, Bolduc, Malcuit, & Cossette, 1990). Since parents surround girls with objects that are pink and boys with objects that are blue, infants may develop a preference for these colours based on familiarity.

Another possibility is that once children identify with a certain gender, they seek out gender-related information and choose toys and colours that are commonly associated with that gender. This idea is not new. Kohlberg's (1966) early work on gender development suggests that children seek out gender-related information and look for ways to conform to these gender norms. More recent cognitive theories of gender development are in line with Kohlberg's original view. Gender schema theory, for example, suggests that over the course of development, children form gender schemas – or representations of information about gender and themselves – by acquiring knowledge from the environment and incorporating that knowledge into their schemas (Martin, Ruble, & Szkrybalo, 2002). This view and several cognitive and constructivist views of gender development suggest that once children recognize their own gender, they actively seek out gender-related information and integrate that information into their developing concept of gender. Ruble and colleagues similarly propose that children are 'gender detectives' and create their own concepts of what gender means to them by actively seeking out gender-related information (Martin & Ruble, 2004; Ruble *et al.*, 2007).

However, it is still unclear from the literature whether children's personal preferences beginning in infancy shape the development of gender stereotypes, or whether children's growing knowledge about gender leads to gender-stereotyped preferences (Liben & Bigler, 2002). These issues will be one of the main focuses of the current investigation.

The current research

The goal of the current research was to investigate young children's colour preferences in the first years of life. Based on previous findings, it seems that *both* boys and girls are attracted to primary colours such as blue. However, there is little research examining children's responses to pink. Pink is an ideal colour to for this line of research, since it is strongly associated with girls and almost taboo for boys. Conversely, while blue is often associated with boys, it is completely acceptable for girls as well. Thus, here we ask: is there an early preference for pink? If so, to what extent do young boys and girls differ in this respect, and how does any such preference change with age?

There are three possible outcomes. The first is that children do not actually have gender-stereotyped colour preferences. In other words, we might find that girls do not prefer pink at any age. A second possibility is that infants develop a preference for pink early in development, which leads to the gender-stereotyped colour preferences that we observe (Chiu *et al.*, 2006; Cohen, 2004). If this is true, then distinct colour preferences should be observed in infancy. A third and final possibility is that children do not develop gender-stereotyped colour preferences until they begin to learn about their own gender. Recent research suggests that children begin to understand and talk about gender between the ages of 2 and 3 (Zosuls *et al.*, 2009). Thus, if colour preferences emerge as a result of children's attempt to identify with their gender, it is likely that these preferences will not be visible until the second or third year.

EXPERIMENT 1

In the first experiment reported here, we examined children's colour preferences over a large cross-sectional sample of children from 7 months to 5 years of age. Each child was offered pairs of objects, one of which was always pink. The children were then offered the two objects. The question of primary interest is whether colour preferences are evident in young children's choices, and at what age (if any) do girls choose pink more frequently than boys do?

Participants

The participants were 192 normally developing children, with 32 children in each of 6 age groups: 7- to 11-month-olds (*m* = 9.3 mos., *range* = 7.3–11.7 mos.), 1-year-olds (*m* = 19.0 mos., *range* = 12.4–23.0 mos.), 2-year-olds (*m* = 29.8 mos., *range* = 24.0–35.4 mos.), 3-year-olds (*m* = 41.8 mos., *range* = 36.0–63.6 mos.), 4-year-olds (*m* = 50.0 mos., *range* = 37.0–59.0 mos.), and 5-year-olds (*m* = 65.0 mos., *range* = 60.0–71.6 mos.). In each age group, half of the children were male, and half were female. The participants were recruited from records of birth announcements and preschools in the local community and were predominantly Caucasian and middle class. Each child was randomly assigned to one of two stimulus orders.

Materials

The materials consisted of eight pairs of small objects: plastic clips, plastic pill boxes, koosh balls, measuring cups, bracelets, picture frames, coasters, and bath poofs. The objects in each pair were identical except for colour – one of the items was always pink, and the other was a non-pink colour (green, blue, yellow, or orange).

Procedure

The child and experimenter sat facing one another on the floor of a laboratory room. On each of eight trials, the experimenter offered the child a pair of objects, asking, 'Which one do you like better?' The pink items were presented equally often on the right and left sides, with side counterbalanced over trials. If a child reached for both objects, the experimenter removed them, and after a few seconds, presented them again until the child chose one (or failed to choose either). Preverbal infants were tested in the same way as the older children – they were simply offered the two items. While a simpler looking time paradigm could have been used for the younger infants, we thought it important to keep the procedure the same across participants. Previous research has shown that infants are able to make preference choices by reaching to their preferred stimulus when offered two objects (i.e., DeLoache, Pierroutsakos, Uttal, Rosengren, & Gottlieb, 1998). Furthermore, previous research has also shown that infants' preferences in looking time tasks match their preferences when reaching for objects (Hamlin, Wynn, & Bloom, 2007).

Two random orders were used for the presentation of the pairs of objects, one being the reverse of the other. Presentation order was counterbalanced across age and gender.

Results

Figure 1 shows the results Experiment 1. As is clear from the data shown, there was no evidence of any preference for pink in infancy. However, beginning around the age of 2, boys and girls diverged in their responses to this particular colour. Girls' liking for pink increased between 2 and 3 years of age and remained high through 4 years. In contrast, boy' response to pink showed a dramatic decline between 3 and 4 years of age.

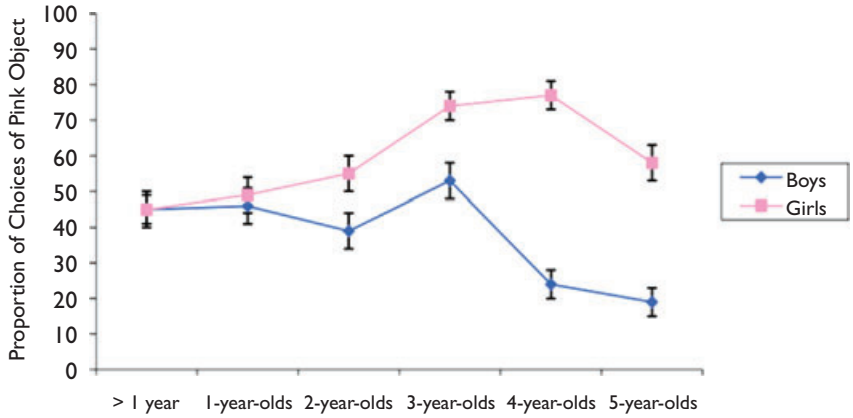

Figure 1. Percentage of trials in which children chose pink in Experiment 1. Error bars denote plus and minus one standard error. There was no significant difference in the frequency with which boys and girls chose pink in the two younger age groups (7- to 11-month-olds and 1-year-olds), but girls chose pink significantly more often than did boys in the older age groups (2-, 4-, and 5-year-olds).

The questions of primary interest were whether girls would choose pink significantly more often than boys would, and, if so, at what age would such a preference be manifested. To address the first question, a 2 (gender) × 6 (age group) × 2 (side: left vs. right) logistic regression was performed on the number of times the children chose the pink object. There was a significant main effect of age, $\chi^2 = 21.94$, $p < .001$. The main effect of gender was not significant.

The most important result was a gender by age interaction, $\chi^2 = 41.05$, $p < .001$. There was no significant gender difference in the frequency of choosing pink in the youngest two age groups (infants under the age of 2). However, in the 2-, 3-, 4-, and 5-year-old age groups, the girls chose pink significantly more often than the boys did (2-year-olds: $\chi^2 = 6.11$, $p < .05$; 3-year-olds: $\chi^2 = 10.62$, $p < .01$; 4-year-olds: $\chi^2 = 58.98$, $p < .001$; 5-year-olds: $\chi^2 = 33.67$, $p < .001$). There was also a significant main effect of side, $\chi^2 = 4.33$, $p < .05$; the children chose objects presented on the right more often than objects presented on the left (a common bias in infant research, for example, MacKain, Studdert-Kennedy, Spieker, & Stern, 1983; Patterson & Werker, 1999; Walker, 1982). Thus, boys and girls younger than 2 did not differ in the frequency with which they chose pink objects, but from 2 years of age on, girls opted for pink significantly more often than boys did.

Having established that the girls chose pink items more often than the boys did, we addressed our second question, and examined whether girls had an actual *preference* for pink by comparing how often pink was selected at different ages. Three- and 4-year-old girls chose pink significantly above chance (3-year-olds: $t = 5.72$, $p < .001$; 4-year-olds: $t = 7.07$, $p < .001$). Furthermore, 2-, 4-, and 5-year-old boys chose pink significantly *below* chance (2-year-olds: $t = -2.42$, $p < .05$; 4-year-olds: $t = -6.38$, $p < .001$; 5-year-olds: $t = -8.38$, $p < .001$) (see Figure 2). These results thus demonstrate that girls indeed have a significant *preference* for the colour pink, and that this preference is first visible at ages 3 and 4. Furthermore, these results also demonstrate that while girls are developing a significant preference for pink around the age of 3, boys are developing a

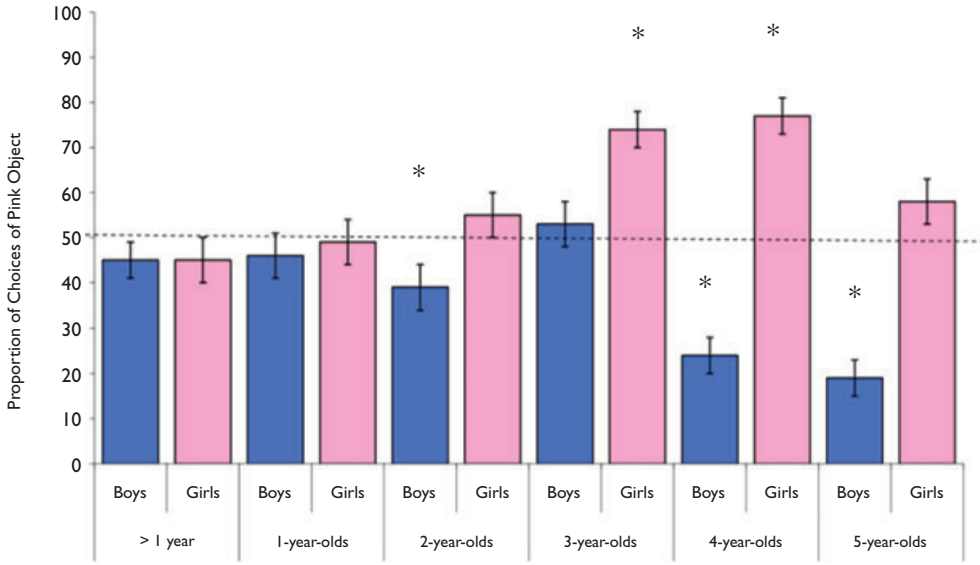

Figure 2. Percentage of trials in which children chose pink in Experiment 1 compared to chance. Error bars denote plus and minus one standard error. Three- and 4-year-olds girls chose pink significantly more often than chance, demonstrating a significant *preference* for pink. Two-, 4-, and 5-year-old boys chose pink significantly less often than chance, revealing a significant *avoidance* of pink.

significant *avoidance* of pink at the same time. This avoidance was significant at ages 2, 4, and 5.[2]

One explanation for the boys' findings is that instead of avoiding the colour pink as boys grow older, it is possible that they habituated to pink over the eight test trials, resulting in a decrease in pink choices. In other words, since pink was offered as a choice in every trial, the decrease in pink choices that we found in boys could have been due to boys' habituation to pink over trials. If this is the case, boys (particularly the oldest boys) should demonstrate a decrease in pink choices from trial 1 to trial 8. To address this possibility, we conducted an additional six (age group) $\times$ eight (trial: 1–8) logistic regression on the boys' colour choices. There was again a significant effect of age (with boys choosing pink more often at younger ages than at older ages), but there was no significant effect of trial ($\chi^2 = 0.49$, *ns*) and no significant interaction. Thus, boys did not change their choices over trials in any of the age groups. We also conducted two separate logistic regressions on just the 4-year-old and 5-year-old boys to confirm this finding. As expected, 4-year-olds did not differ in their choices over trials ($\chi^2 = 0.52$, *ns*), and neither did 5-year-olds ($\chi^2 = 1.92$, *ns*). This suggests that older boys did indeed avoid pink and did so consistently across the eight test trials.

These data thus suggest that children's colour preferences appear around the ages of 2 (boys) and 3 (girls) – around the same time that children begin to understand and talk about gender (Zosuls *et al.*, 2009).

[2] *Because boys show a significant avoidance for pink at ages 2, 4, and 5, we can rule out that girls' increasing preference for pink was merely an artifact of girls' increasing compliance with an experimenter who repeatedly shows them the same colour. While girls are generally more compliant than boys, there is no reason to expect that boys would become increasingly* non-compliant *to an experimenter's requests, and begin avoiding pink.*

EXPERIMENT 2

The results of Experiment 1 reveal that by the age of 2, girls choose pink objects more frequently than boys do, and that by the age of 3, girls have a significant preference for pink over other colours. Furthermore, between the ages of 3 and 4, boys show a dramatic avoidance of pink, choosing pink significantly less often than other colours. Given that there were no gender differences in the colour preferences of children under the age of 2, the data indicate that girls shift to choosing pink over other colours sometime during the second year.

To examine this transition further, Experiment 2 focused on children's colour preferences within the second year. The same procedure as in Experiment 1 was used to examine the colour preferences of 24- to 29-month-olds and 30- to 35-month-olds.

Participants

The participants were 64 2-year-olds, including the 32 2-year-olds tested in Experiment 1, plus an additional 32 normally developing 2-year-olds ($m = 30.3$ mos., *range* = 25.0–35.6 mos.), half boys, and half girls. The 64 children were divided into two equal groups of 32 each: 2-year-olds, ($m = 27.2$ mos., *range* = 24.0–29.9 mos.) and 2.5-year-olds ($m = 32.5$ mos., *range* = 30.0–35.6 mos.). Each child was randomly assigned to one of the two stimulus presentation orders.

Procedure

All participants were tested using the same procedure as in Experiment 1.

Results

The question of primary interest in Experiment 2 was whether there would be a difference in the frequency of choosing pink objects from the first half of the second year to the second half. In a 2 (gender) $\times$ 2 (side: left vs. right), two (age group: 2-year-olds vs. 2.5-year-olds) logistic regression on children's colour choice (pink or non-pink), there was a significant main effect of gender, $\chi^2 = 6.41$, $p < .05$. The girls chose pink objects significantly more often than the boys did in both age groups (66% overall for girls and 40% for boys).

There was also a gender by age group interaction $\chi^2 = 3.90$, $p < .05$. The 2- and 2.5-year-old boys did not differ in how often they chose pink, but there was a significant increase in how frequently the girls chose pink between the ages of 2 and 3 ($\chi^2 = 4.0$, $p < .05$). Thus, the onset of the girls' preference for pink occurred in the second year.

To determine whether there was a difference in children's *preference* for pink between the first and second half of the second year, we compared the frequency of their choice of pink to chance. The 2-year-old girls displayed a marginal preference for pink ($t = 1.98$, $p < .06$, and the 2.5-year-old girls chose pink significantly more often than chance ($t = 5.30$, $p < .01$). Conversely, the 2.5-year-old boys chose pink at significantly *below* chance levels ($t = -2.84$, $p < .01$). The 2-year-old boys did not differ from chance ($t = -1.77$, *ns*) (see Figure 3).

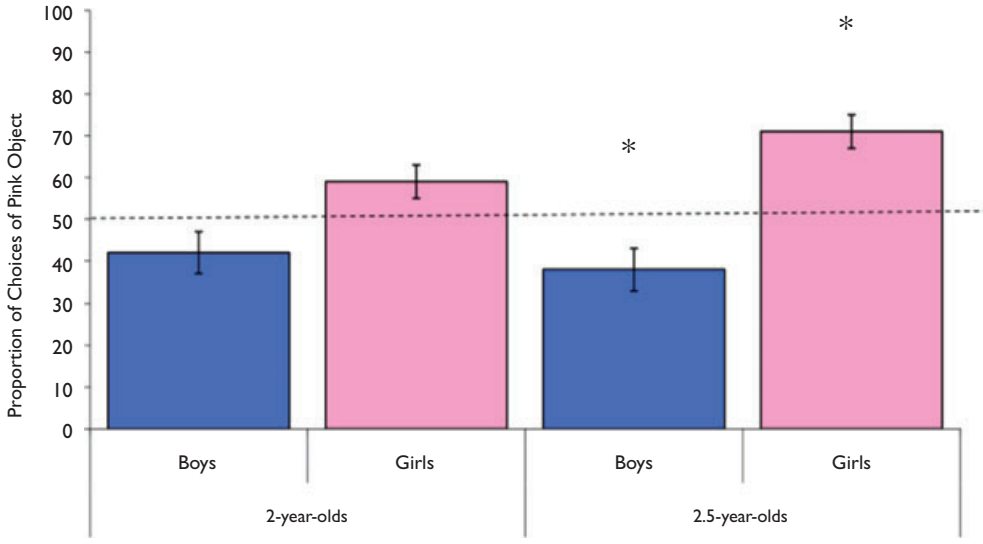

Figure 3. Percentage of trials in which children chose pink in Experiment 2 above and below chance. Error bars denote plus and minus one standard error. The 2.5-year-old girls chose pink significantly more often than chance, while 2.5-year-old boys chose pink significantly less than chance. There were no significant effects in the youngest age group.

GENERAL DISCUSSION

The research reported here establishes a divergence in the first few years of life with respect to girls' and boys' reaction to the colour pink. As Experiment 1 showed, by the age of 2.5, girls have developed a significant preference for pink over other colours. Furthermore, at the same time that young girls display an increasing *preference* for pink, boys show an increasing *avoidance* of pink. At the age of 2, boys choose pink significantly less often than girls do. Experiment 2 builds on this finding and shows that by 2.5, boys display a strong avoidance of pink, choosing it at a rate significantly below chance. This result was especially pronounced at ages 4 and 5. Thus, the familiar attraction that girls have shown to pink begins in the second year and is paralleled by a tendency for boys to avoid pink.

The current research has important implications for how gender-stereotyped preferences emerge. As mentioned previously, between the ages of 2 and 3, children begin to seek out gender-related information (Zosuls *et al.*, 2009). Several researchers have suggested that this effort to explore gender helps children form their own gender concepts and eventually, their own gender identity (Martin & Ruble, 2004; Ruble *et al.*, 2007). Consistent with this view, our data provide evidence that around the same time that children begin to talk about gender and seek gender-related information, they also begin to demonstrate gender-based colour preferences: girls first demonstrated a preference for pink at the age of 2.5. Thus, if the colour pink is part of what identifies 'girliness', then it is not surprising that girls at this age are attracted to it.

In the same way, if pink is what helps define a girl, it is not surprising that boys would have the opposite reaction. In fact, several researchers have suggested that the process of gender segregation involves a developing preference for same-sex behaviours

as well as an avoidance of opposite-sex behaviours (Golombok *et al.*, 2008; Ruble *et al.*, 2007). Consistent with this idea, Jadva *et al.* (2010) reported that male infants as young as 12 months of age prefer to look at images of dolls over cars, and avoidance of dolls is acquired later in development. This idea is consistent with the current findings: while girls demonstrated a developing preference for pink, boys showed a somewhat equal developing avoidance of pink.

The current findings are inconsistent with recent work that suggests that gender-based colour preferences may have a biological basis. Some researchers have proposed that there may have been an evolutionary advantage for women who were attracted to the bright colours of fruits and leaves, and thus, women may have developed an inborn preference for colours such as pink (Alexander, 2003; Hurlbert & Ling, 2007). The current results do not support this possibility. If females have a biological predisposition to favour colours such as pink, this preference should be evident regardless of experience or the acquisition of gender concepts, and in the current research, a preference for pink did not emerge in girls until the age of 2.5.

While the current experiments lend important information about the development of children's gender-based colour preferences, they do have some limitations. Primarily, these experiments only examine children's colour preferences in the first 5 years of life. What remains unclear is what patterns would emerge in children's preferences in middle to late childhood and even later into adolescence. Would girls maintain a preference for pink, or would this preference disappear with age? The current results suggest that girls' preference may wane as they get older: while girls showed a significant preference for pink at 2.5, 3, and 4, there was no longer a significant preference for pink at age 5. It is unclear from the current data whether such a preference would resurface in later childhood, or whether it only exists between the ages of 2 and 4.

There is some research that suggests that perhaps girls' preference for pink would in fact decrease with age. In a large longitudinal study, Trautner *et al.* (2005) found that children are very rigid in their beliefs about gender-stereotyped behaviour in their preschool years. In other words, 3- and 4-year-olds believe that certain behaviours are meant solely for girls, while others are only meant for boys. However, by the ages of 5 and 6, children are more flexible about these gender rules, admitting that both boys and girls can both do most things. Thus, it is possible that by the age of 5, girls are no longer as rigid in their ideas about gender norms and begin choosing colours other than pink. In the same way, boys' rigidity in avoiding pink might also wane with age. It is not uncommon to see adult business men dressed in pink dress shirts or neckties. It could be that by later in childhood or adolescence, boys become less likely to avoid pink. Future research examining children's colour preferences into later childhood and adolescence would provide a broader understanding of how gender-based colour preferences change in later development.

Another limitation of the current work is that it does not directly address the mechanism by which girls begin to show a preference for the colour pink. We were not able to collect data on our participants' gender knowledge, so we cannot confirm that girls' growing preference for pink develops concurrently with their developing ideas about gender identity. However, our results do show that between the ages of 2 and 3, the same age that previous research has shown that children begin to understand and talk about gender (Zosuls *et al.*, 2009), girls begin to show a growing preference for the colour pink, while boys begin to show a growing avoidance of it. Thus, this suggests that instead of a genuine aesthetic change in children's preferences (e.g., for

girls, an increasing genuine attraction to pink in relation to other colours, and for boys, an increasing genuine dislike for pink), girls' increasing preference for pink may be an effort to adopt behaviours that help them relate to their own gender. This is consistent with several views of gender development: as children development their own concepts of gender, they actively seek out gender-related information and assimilate it into their own gender schemas (Martin & Ruble, 2004; Ruble *et al.*, 2007; Zosuls *et al.*, 2009). Boys' behaviour in the current work is also consistent with this idea: as boys learn what it means to be a girl, they begin to avoid anything that can possibly define 'girliness'. Future research that involves collecting longitudinal data on children's developing colour preferences and on their emerging gender identity would provide a stronger test of our claims.

In conclusion, the current findings demonstrate that young girls do indeed have a special affinity for the colour pink that appears sometime in the second half of the second year. Furthermore, while girls are developing a preference for pink with age, boys are developing an avoidance of pink at the same time. This research lends important information to when children develop gender-stereotyped colour preferences and has important implications for how they develop as well. Knowing exactly when children begin to demonstrate these tendencies can help lead to fuller understanding of the development of gender-stereotyped behaviour more generally and can be an important marker for future research in this domain.

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