

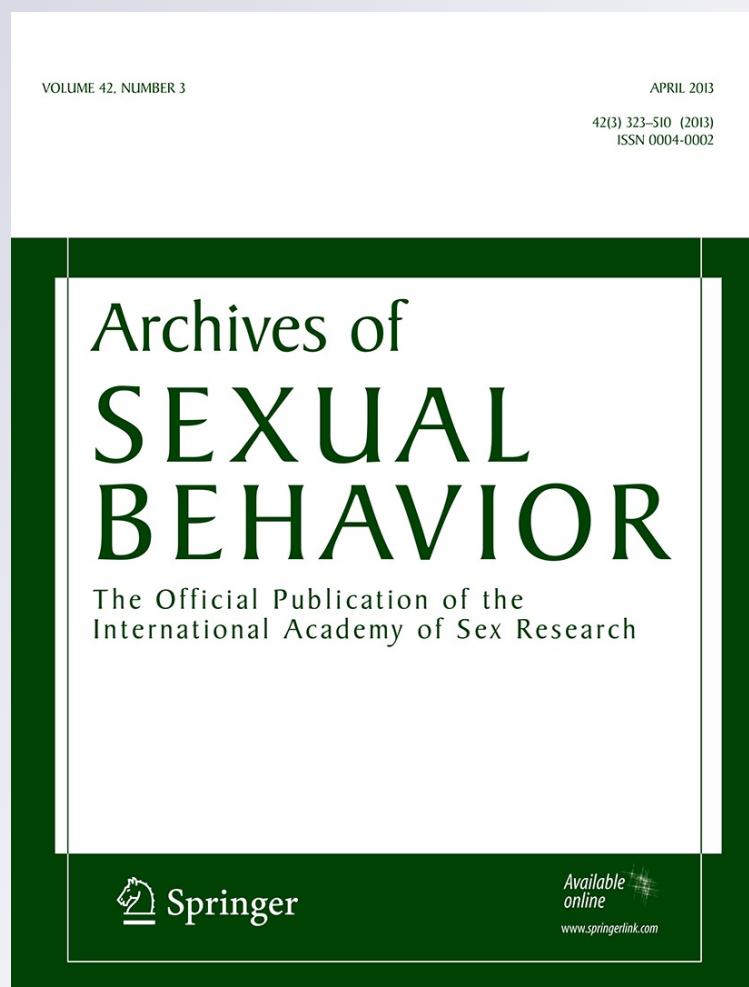
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Archives of Sexual Behavior
The Official Publication of the
International Academy of Sex Research

ISSN 0004-0002
Volume 42
Number 3

Arch Sex Behav (2013) 42:393-397
DOI 10.1007/s10508-012-9951-5



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Received: 16 February 2011 / Revised: 29 September 2011 / Accepted: 11 February 2012 / Published online: 29 March 2012
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Abstract Gender differences in color preferences have been found in adults and children, but they remain unexplained. This study asks whether the gendered social environment in adulthood affects parents' color preferences. The analysis used the gender of children to represent one aspect of the gendered social environment. Because having male versus female children in the U.S. is generally randomly distributed, it provides something of a natural experiment, offering evidence about the social construction of gender in adulthood. The participants were 749 adults with children who responded to an online survey invitation, asking "What's your favorite color?" Men were more likely to prefer blue, while women were more likely to prefer red, purple, and pink, consistent with long-standing U.S. patterns. The effect of having only sons was to widen the existing gender differences between men and women, increasing the odds that men prefer blue while reducing the odds that women do; and a marginally significant effect showed women having higher odds of preferring pink when they have sons only. The results suggest that, in addition to any genetic, biological or child-socialization effects shaping adults' tendency to segregate their color preferences by gender, the gender context of adulthood matters as well.

Keywords Sex · Gender · Parents · Sex differences · Color preference

Introduction

Gender differences in color preference remain unexplained. Gendered preferences have been found in adults (Ellis & Ficek,

2001) and children, and across some cultural groups (Hurlbert & Ling, 2007; Saito, 1996). Because gender patterns are consistent across some groups (Hurlbert & Ling, 2007), cultural studies may be interpreted as providing support for the notion of biological origins, but the cross-cultural evidence is relatively scant. Further, contemporary color preferences, at least in the United States, have emerged relatively recently (Paoletti, 2012). Sex differences in color perception have been found, but there is also wide heterogeneity within the sexes and the causes for perception differences are not fully understood (Bimler, Kirkland, & Jameson, 2004; Pardo, Perez, & Suero, 2007).

Within-culture historical change supports the idea of social construction in color preferences. For example, the current stereotypical American assignment of pink to girls and blue to boys was reversed a century ago, when *Ladies Home Journal* (in 1918) described pink as "a more decided and stronger color," appropriate for boys, compared with blue, "which is more delicate and dainty"; and an American newspaper in 1914 advised, "If you like the color note on the little one's garments, use pink for the boy and blue for the girl, if you are a follower of convention" (Frassanito & Pettorini, 2008, p. 881). Note, also, that the very practice of color-coding children was far from universal at the start of the twentieth century—as indicated by the phrase "If you like the color note..." (emphasis added). In fact, the practice was controversial, outraging some feminists, including Charlotte Perkins Gillman, who wrote in 1910 of the "most conspicuous evil [in] the premature and unnatural differentiation in sex in the dress of little children" (Paoletti, 1987, p. 142).

Despite the relatively recent nature of contemporary gender typing by color, there are differences in color processing and preferences among children, which may have biological origins. Children in many contexts show gender-differentiated styles of play and toy preferences (Alexander, 2003) and hormonal processes are known to affect sex-dimorphic behavior (Cohen-Bendahan, van de Beek, & Berenbaum, 2005; Hines, 2010).

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However, several studies of infants have found no significant gender differences in their tendency to stare at colors (Franklin, Bevis, Ling, & Hurlbert, 2010; Jadva, Hines, & Golombok, 2010). Therefore, although speculative reasons have been offered for an evolutionary basis for gender differences (Alexander, 2003), social learning remains a likely determinant of gendered color preferences.

In summary, despite an increase in attention to gender in color perception and preferences, further research is needed to understand the role of biological, environmental, and cultural factors in color preferences. Specifically, no research has tested whether gender-differentiated experiences in adulthood affect color preferences. This study describes color preferences in a sample of adults and tests for the effect of having male versus female children on parents' preferences. Unlike indicators of adult lifestyle or experience, such as education or occupation—which may reflect gender-related predispositions, choices or discrimination—the gender of one's children is mostly randomly assigned. Therefore, children's gender offers something of a natural experiment, permitting a test of the influence of experiences in adulthood on gender-related preferences for color. Rather than predicting a particular pattern of influence, this study simply asks whether the gender of adults' children perturbs the gendered order of color preferences, offering evidence about the social construction of gender in adulthood.

Adult Socialization

Color preferences appear to change from childhood to adulthood. Infants of both sexes prefer reddish colors (Franklin et al., 2010; Jadva et al., 2010) while blue is most commonly favored among adults (Hurlbert & Ling, 2007), especially men. Relative to men, American women are more likely to prefer pink or purple (Ellis & Ficek, 2001). We do not know what determines the patterns of changing preference—if any—over the course of development. If there are genetic or biological factors, we need to consider the complex ways that social context or environment intervene (Perrin & Lee, 2007). With regard to gender in particular, the multiple levels of context span from the interpersonal (West & Zimmerman, 1987) to the macro-cultural (Fuwa & Cohen, 2007).

The effect of gendered family interaction on adults' gender-related behavior is apparent in a variety of studies. Congressional representatives with daughters are more likely to vote liberally on reproductive rights issues (Washington, 2008); parents with daughters are more supportive of gender equity policies (Warner & Stell, 1999), and more likely to vote for left-wing political parties (Oswald & Powdthavee, 2010). On the other hand, although mothers of daughters are more supportive of affirmative action for women, the opposite effect was found for fathers of daughters, while sons have no effect (Prokos, Baird, & Keene 2010). Mothers may be affected hormonally by the sex of

their children during gestation (Grant, 2008), but we do not have evidence that this drives long-lasting behavioral patterns. Further, there is no reason to suspect biological (rather than social) effects of children's gender on their fathers.

Considerable research demonstrates that American parents raise their children within a dominant cultural scheme in which pink is associated with girls and blue (or other dark colors) is associated with boys (Shakin, Shakin, & Sternglanz, 1985). For example, one study of middle-class American preschools, in which researchers observed three months of classes in two different schools, found 61 % of girls dressed in something pink each day and no boys were seen wearing pink ever (Martin, 1998). Although this gender pattern has been linked to a wider consumer marketing culture aimed at parents (Orenstein, 2011), its impact on parents themselves has not been studied. Given the strong association between gender of children and the color of clothes and other items of consumption, it is reasonable to describe children's gender as part of the gendered context within which parents experience color—with implications for how their preferences may change in adulthood.

Method

Participants

Online survey data were collected over 5 months, from mid-April through mid-September 2010. Of 2,103 original participants, 104 were excluded for incomplete or invalid responses (most commonly: not picking one of the proffered colors, age under 18, or failure to specify age or parental status). From the remaining sample, 749 who reported being parents were retained for the analysis (age range, 20–79 years), with more women ($N = 564$, M age, 47.7 years) than men ($N = 185$, M age, 49.8 years). Of the retained sample, 85 % responded within 2 weeks of an email announcement sent to all subscribed students, staff, and faculty at a large state university in the southeastern U.S., and presumably responded to that invitation; the remainder was recruited anonymously via social networking Internet sites. All announcements began with the simple question, “What's your favorite color?”, and provided a link to SurveyMonkey.com. Current students (at any level) comprised 8 % of the parent sample. The larger number of women than men in the sample may reflect a greater interest in the subject among women or women's greater tendency to respond to surveys in general (Porter & Whitcomb, 2005). Because the primary purpose of the analysis was to examine within-gender patterns of color preference, the gender imbalance in the sample is acceptable.

Measures

Color preference was measured by the question, “Which of these colors do you most prefer?”, accompanying an image showing

colored bars of purple, blue, green, yellow, orange, red, and pink.¹ In addition to gender, the main variable of interest was the gender of participants' children, which was measured with a four-choice question, "Do you have any children? No; Girl(s) only; Boy(s) only; Both boy(s) and girl(s)." In the analysis, these were reduced to two dummy variables, with one indicating participants who have only boys (32 %) and one indicating only girls (28 %), with parents of both boys and girls as the reference category (40 %). Age of the children was not recorded.

A variety of additional measures were collected, but were not used in the final analysis because of insignificant effects or effects that were inconsequential for gender in the multivariate analysis. These included race/ethnicity (11 % other than non-Hispanic White), current student, college graduate (75 %), married (79 %), and whether the response was entered in the period shortly following the campus email (88 %).

Analysis

The first step of the data analysis tested the gender difference in color preference, with and without adjustment for age differences between men and women. The age adjustment is important because those with more than one child—who are older, on average—were more likely to have both boys and girls, but the total number of children was not recorded. The unadjusted comparison was performed using χ^2 tests, while logistic regression was used for the age-adjusted odds ratios. The second step tested for effects of children's gender, using multivariate logistic regressions with gender interaction effects to test for differences in the odds of preferring each color by children's and parents' gender, while holding age constant.

Results

Preferences by Gender

Table 1 shows the unadjusted distribution of preferences of mothers and fathers, with χ^2 tests for the gender differences. Men were more likely to prefer blue, while women were more likely to prefer purple and pink, consistent with long-standing U.S. patterns (Silver et al., 1988). The gender pattern adjusted for age is shown in Fig. 1 as male/female odds ratios, with 95 % confidence intervals. The results show that blue was preferred by more men, while red and purple were preferred by more women. Pink was too gender-skewed ($N = 1$ man) to calculate reliable odds ratios and orange was too rare ($N = 21$). However, because an adequate number of mothers chose pink

Table 1 The distribution (%) of color preferences among adults with children

	Men	N	Women	N	χ^2	p
Orange	4.9	9	2.1	12	3.83	.050
Blue	42.2	78	25.9	146	17.60	<.001***
Green	20.0	37	15.4	87	2.11	ns
Yellow	7.6	14	7.1	40	<1	ns
Red	7.0	13	11.7	66	3.23	.072
Purple	17.8	33	31.2	176	12.37	<.001***
Pink	0.5	1	6.6	37	10.48	.001**
N		185		546		

Gender differences: * $p < .05$; ** $p < .01$; *** $p < .001$
 ns non-significant

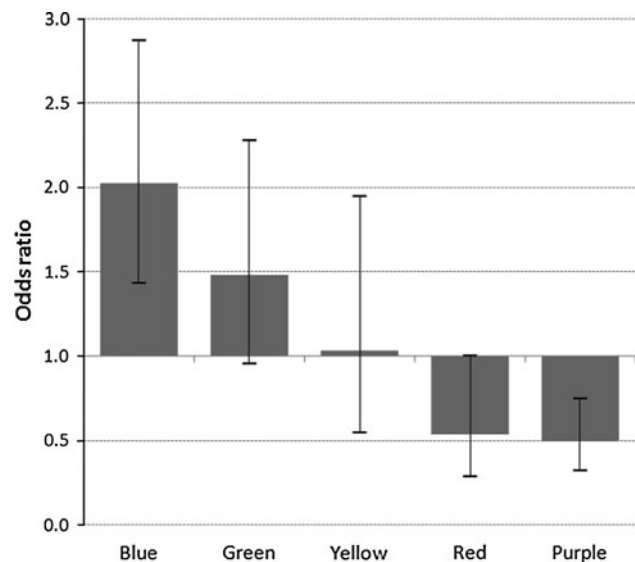


Fig. 1 Male/female color preference: Age-adjusted odds ratios (with 95 % confidence intervals). In RGB coding the screen colors used were: Purple, R:112 G:48 B:160; Blue, R:0 G:113 B:200; Green, R:25 G:151 B:41; Yellow, R:255 G:255 B:0; Orange, R:255 G:192 B:0; Red, R:254 G:0 B:0; Pink, R:255 G:102 B:255. Orange did not have enough responses to include with age adjusting (see Table 1) and pink did not have enough male responses for comparison

($N = 37$), they were retained for the next step, which analyzed within-gender patterns.

Gender of Children

Table 2 shows the effect of children's gender on adults' color preferences, in age-adjusted odds ratios. The odds ratios showed the relative likelihood of choosing each color for those with either boys only or girls only, relative to the reference category of those with both boys and girls. Women with male children only were significantly less likely to prefer blue and (marginally) more likely to prefer pink ($p = .08$). The effects for red and purple were in the same direction but not statistically significant. On the other hand, men with sons were more likely to prefer blue.

¹ Specifically, in RGB coding, the screen colors used were: Purple, R:112 G:48 B:160; Blue, R:0 G:113 B:200; Green, R:25 G:151 B:41; Yellow, R:255 G:255 B:0; Orange, R:255 G:192 B:0; Red, R:254 G:0 B:0; Pink, R:255 G:102 B:255.

Table 2 Effects of children's gender (odds ratios) on adults' color preferences

		Women		Men	
		Odds ratio	p	Odds ratio	p
Blue	Boys only	.51	.03	2.25	.03
	Girls only	.75	ns	1.89	.09
Green	Boys only	.97	ns	.48	ns
	Girls only	1.49	ns	.53	ns
Yellow	Boys only	.77	ns	.50	ns
	Girls only	.91	ns	.47	ns
Red	Boys only	1.50	ns	1.44	ns
	Girls only	1.22	ns	1.69	ns
Purple	Boys only	1.23	ns	.86	ns
	Girls only	.77	ns	.52	ns
Pink	Boys only	2.11	.08	–	
	Girls only	1.67	ns	–	

Note Reference category is parents with both boy(s) and girl(s)

ns non-significant

Thus, the effect of having only sons was to widen the existing gender differences between men and women. The sole significant effect of having girls only was to increase men's tendency to prefer blue (marginally, $p = .09$).

Discussion

The rearing of boys in a boy-only family may reinforce existing gender distinctions between men and women, by widening the gap in gender preferences for blue versus pink. The fact that having boys, but not girls, showed this effect on parents was consistent with some suggestions in the literature that American boys' gender socialization is more rigid than girls'—that is, appropriate standards of gender socialization are more narrow for boys than for girls. (e.g., Martin, 1998; Risman & Seale, 2010). Alternately, it may be that having children of the same gender produces this effect, perhaps through the experience of a more gender-uniform parenting environment; the effects of having only girls were mostly in the same direction as having only boys. However, the possibility these were simply effects of having fewer children cannot be ruled out, since the total number of children was not controlled, and those with children of only one gender will have fewer children on average. Controlling for age may help mitigate this potential confound.

Although there is considerable research and consternation over the effects on children of rigid gender stereotyping, including color segregation in clothes, toys, and decorations (e.g., Orenstein, 2011), the effects of this cultural practice on parents have not been the subject of extensive research. These results suggest that the gender of parents' children affects their color

preferences and that, in addition to any genetic, biological or child-socialization effects shaping adults' tendency to segregate their color preferences by gender, the gender context of adulthood matters as well. These results thus contribute to our understanding of gender socialization as a lifelong process.

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