NOTES

GENDER, COMPETITIVENESS, AND SOCIALIZATION AT A YOUNG AGE: EVIDENCE FROM A MATRILINEAL AND A PATRIARCHAL SOCIETY

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Abstract—Recent literature presents evidence that men are more competitively inclined than women. Since top-level careers usually require competitiveness, competitiveness differences provide an explanation for gender gaps in wages and differences in occupational choice. A natural question is whether women are born less competitive or whether they become so through the process of socialization. To pinpoint when in the socialization process the difference arises, we compare the competitiveness of children in matrilineal and patriarchal societies. We find that while there is no difference at any age in the matrilineal society, girls become less competitive around puberty in the patriarchal society.

I. Introduction

In most societies around the world, men earn more money than women and are more likely to hold high-status jobs.[1] Recent findings suggest that some of the gap may result from different tendencies of men and women to compete.[2] In particular, one stylized fact emerging from the literature is that men are more likely to self-select into environments that involve competition than women, as opposed to individualistic incentive schemes. Such data patterns might provide insights into why we observe a higher fraction of women than men among, for example, elementary school teachers but the reverse among high-level executives.

Gender differences in competitiveness may have some evolutionary reasons and are not unique to humans; a large body of literature in evolutionary biology and sociobiology documents differences in competitiveness between males and females in many species.[3] Recent research in economics has also attempted to correlate gender differences in different types of economic behavior with biological factors (see Croson & Gneezy, 2009, for a review). In contrast to the view that gender differences have an evolutionary or "natural" basis, a sizable body of research in psychology and sociology has put forward the sociocultural construct of gender and gender roles as a potential factor behind gender differences in behavior and outcomes (see, for example, Eagly, Wood, & Diekman (2000). To provide a direct test of the effect of culture on the gender gap in competitiveness, Gneezy, Leonard, and List (2009) study two distinct societies, the Masai of Tanzania and the Khasi of northeast India. The comparison between the two societies is important because they represent very different cultures in terms of gender roles. While the Masai are a textbook example of a patriarchal society, the Khasi are a matrilineal society. The main objective in that study is to examine whether women and men in more gender-equal societies compete at a different level than women and men do in nonequal societies.

Gneezy et al. (2009) find that the gender gap in the patriarchal society is similar to that found in Western societies. However, the gap is reversed in the Khasi matrilineal society, where women compete more than men. This result provides strong evidence against the nature straw man, showing that socialization is also important in determining competitiveness. An important question that is left open, however, is at what age the gender difference begins. Answering this question could help us in understanding the source of the gender difference and devising potential policies to reduce it.

To that end, this paper reports the results of experiments with 7- to 15-year-old children in matrilineal and patriarchal villages in northeast India. The main finding is that there are no gender or society differences in our experiments at the age of 7, but that by the age of 15, the two societies exhibit very different patterns in terms of the gender gap in competition. The average behavior of children in the matrilineal society does not change relative to that of the 7-year-old as they age. In particular, boys and girls are equally likely to choose to compete at any age group. In the patriarchal society, however, boys become more competitive and girls less competitive around puberty. As a result, 15-year-old girls are significantly less likely to compete than boys around the same age, and we observe a strong gender gap in the patriarchal society that is similar to the one found with adults. Hence, it appears that the source of the gender gap is in the period when children hit puberty, a period when cultural forces might interact with biological changes to influence decisions.

Apart from the contribution of our findings to the understanding of the source of the gender gap, the results also provide important insights into the design of public policies. They suggest that a policymaker interested in reducing the gender gap should target children around the age of puberty, when the policy might be most effective.

II. Brief Societal Background

We ran our experiment in matrilineal and patriarchal villages in the same general region of Meghalaya in northeast India. The matrilineal villagers in our study belong to the Khasi tribe, and the patriarchal villagers are of the Kharbi tribe. The Kharbi are considered to be the closest to the Khasi in terms of biology and origin. The two tribes are located in the same region and engage in similar economic activities. Yet the social organization of the two societies is quite different. In the Khasi, inheritance and clan membership always follow the female lineage through the youngest daughter. Family life is organized around the mother's house headed by the grandmother, who lives with her unmarried daughters, her youngest daughter (even if she is married), and her youngest daughter's children. In addition, her unmarried, divorced, or widowed brothers and sons reside in the home. Even when married men reside with their wife's family, they

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[1] For example, Altonji and Blank (1999), Blau and Kahn (1992, 2000), and Blau, Ferber, and Winkler (2002).

[2] Gneezy, Niederle, and Rustichini (2003), Gneezy and Rustichini (2005), and Niederle and Vedsterlund (2007).

[3] See Knight (2002) or Tregenza and Wedell (2002) for recent overviews. The debate is a classic in the field, see Darwin (1871), Bateman (1948), and Trivers (1972).

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spend much, if not most, of their time in the mother's or sisters' household (Van Ham, 2000; Nakane, 1967). Women are therefore raised from infancy in their mother's or grandmother's home. Importantly, the youngest daughter never leaves and eventually becomes the head of the household, whereas older daughters usually form separate households adjacent to their mother's household. Further, women never join the household of their husband's family, and some men leave their mother's household to join their wife's household. In some cases, men practice duolocal marriage: they live in both their mother's and their wife's households. Men, and in particular husbands, frequently hold roles that seem to mirror those of women in patriarchal societies. The Khasi husband dwells in a household in which he has no authority or property and is expected to work for the gain of his wife's family. The status of men in Khasi society has in fact been the source of a men's rights movement (Ahmed, 1994; Van Ham, 2000; Nonbgri, 1988).

The Kharbi society is organized in the usual patriarchal structure: men possess ownership of the land and have power over household monetary decisions. Lineage also descends through the male, and women move to the household of their husband when they marry. These differences in social structure provide a unique opportunity for studying how attitudes toward competition across gender vary over culture. Having data on the choices of children of different ages can especially help us understand the time course of the gender differences by giving insight into the potential effects of gender socialization in each type of society.

III. Experimental Design

We collected data from four villages in the Meghalaya district of northeast India in November 2008. Two of these villages were matrilineal, and two were patriarchal. In total, 318 children aged 7 to 15 participated.[4] The children were recruited through an announcement made in the village school and with the consent of their parents or guardians. We have data from 75 girls and 71 boys in the patriarchal villages and from 76 girls and 96 boys in the matrilineal villages.[5]

After showing up for the experiment, children were randomly assigned ID numbers, and instructions were explained to them in the local language (Khasi or Kharbi, depending on tribe).[6] In previous literature, it has been shown that whether the task is in the male or female domain can have an impact on the gender gap in competitiveness (see Niederle & Vesterlund, 2011, and its references). Our experimental task was throwing tennis balls into a bucket that was placed 10 feet away. This task was chosen because it is simple to explain and implement, and previous work (Gneezy et al., 2009) had established that there are no gender differences in ability, which is also confirmed by our findings.[7] Although there were no differences in performance, ball throwing may still be viewed as a masculine task. Therefore, our results show that socialization may eliminate gender differences in competitiveness even in a task that might be in the male domain.

The children were told that they would have five chances to throw a ball into the bucket and could choose between two payment options. The choice of incentives was the only choice the participants in our experiment were asked to make. The piece-rate option paid 10 Indian rupees per successful shot (the ball had to enter the bucket and stay in it) and depended on only the participant's own performance.[8] The second option was a tournament payment scheme in which earnings depended on the comparison of the subject's performance to that of a randomly matched subject from another group of participants. This option paid 30 rupees per successful shot if and only if the participant outperformed the randomly selected participant that he or she was matched with. In case of a tie, the subject who chose the tournament option was paid 10 rupees per successful shot; if the subject was less successful the opponent, he or she was paid nothing.

After the task was explained, the children were taken into a room in groups, where there were buckets placed 10 feet away from a line. Each child knew that he or she would be matched with someone from outside his or her group. They were (privately) asked their choice of payment scheme and were also asked about their age and their grade in school. After this, the children completed the task and were directed to another location where they were paid their earnings in cash. As promised, the children were never given the opportunity to learn with whom they were paired.

IV. Results

Figure 1 and table 1 show the frequency of competition choice across gender, age group, and societal structure. We focus on comparing prepuberty children with children around puberty, since the transition into adolescence creates a natural benchmark that reflects both biological and possibly related cultural forces.[9] We see no significant differences in competitive behavior across gender or culture for the younger children aged 7 to 12. That is, younger boys' and girls' competition propensities are not different from each other in either the matrilineal or the patriarchal society ($p = 0.48$ and $p = 0.80$, respectively).[10]

By the ages of 13 to 15, as girls and boys or approach or enter adolescence, there is still no significant difference between boys' and girls' competitiveness in the matrilineal society ($p = 0.62$). In contrast, in the patriarchal society, girls around puberty exhibit a significantly lower propensity to compete compared to boys of the same age in the same villages ($p < 0.01$). This result suggests that the gender difference in competitiveness that is commonly observed in adults arises around puberty in societies with traditional gender roles, whereas such a difference never materializes in a matrilineal society.

Assuming that the natural forces of puberty act in similar ways for matrilineal and patriarchal societies, one can look within gender, across society to better understand the role of socialization. In tests of proportions, we find that neither younger girls nor younger boys are significantly different in terms of competitiveness from their counterparts in the other society ($p = 0.63$ and $p = 0.36$, respectively). However, older girls in the matrilineal society are significantly more com-

[4] Five additional participants were excluded from the analysis because they were below the age limit of 7 years. Inclusion of those observations does not change the results.

[5] Since the participant pool consisted of children in the village school, our sample is thinner in the older age groups in our age range because of attrition.

[6] Instructions in English are provided in appendix A.

[7] We find no statistically significant differences at the 5% level across gender and society in performance using Kolmogorov-Smirnov tests. However, we do find that task performance improves with age.

[8] Ten rupees were about 25 American cents at the time, and about an hour's wage at the villages we studied. This level of incentives was chosen in order to provide high enough motivation without causing choking under pressure (Ariely et al., 2009).

[9] Based on survey data collected in the same region as well as on other literature (Oster & Thornton, 2009), we take the age of puberty onset to be 13. Our results are robust to taking ages 12 or 14 as the cutoff.

[10] All tests of differences in means reported in the results section are the findings of nonparametric tests of proportions.

FIGURE 1.—FREQUENCY OF COMPETITION CHOICES

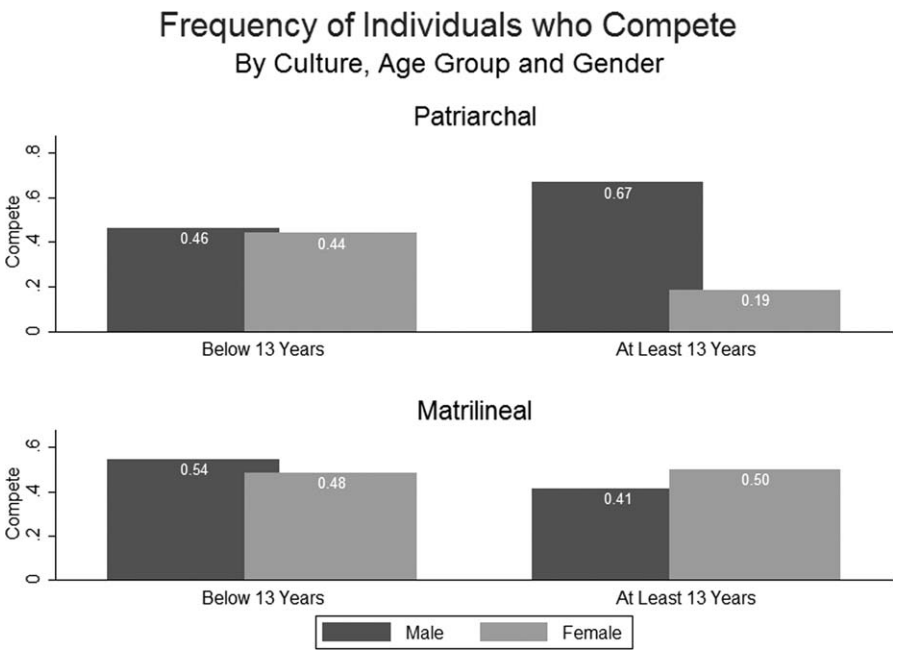


TABLE 1.—FREQUENCY OF COMPETITIVE CHOICES

	7–12 Years Old	13–15 Years Old	All
Patriarchal girls	0.441 (0.07) [59]	0.188 (0.10) [16]	0.387 (0.06) [75]
Patriarchal boys	0.464 (0.07) [56]	0.667 (0.12) [15]	0.507 (0.06) [71]
Matrilineal girls	0.484 (0.06) [62]	0.5 (0.13) [14]	0.487 (0.06) [76]
Matrilineal boys	0.544 (0.06) [79]	0.412 (0.12) [17]	0.521 (0.05) [96]
All	0.488 (0.03) [256]	0.436 (0.06) [62]	

The means are the main number, standard errors are in parentheses, and the number of observations is in brackets.

petitive than older girls in the patriarchal society ($p = 0.07$ in a two-sided test, $p = 0.035$ in a one-sided test). In contrast to this pattern, older boys in the patriarchal society are more competitive than older boys in the matrilineal society, but this difference does not reach statistical significance at conventional levels.[11] If we look at changes within each society and gender over age, we see that in the patriarchal society, girls become significantly less competitive around puberty ($p = 0.07$). Older boys in the patriarchal villages also compete more than younger boys in the same patriarchal villages; however, this is significant only at the 10% level in a one-sided test. In the matrilineal villages, we find no statistical differences over age for either gender.

To examine the within-gender nature and nurture effects over time across the two societies, we also use a difference-in-difference regression. While there is a decline in girls' competitiveness around puberty in the patriarchal society, there is actually a slight increase in competitiveness for older girls in the matrilineal society. Boys also show different patterns across society as they age: while they become more competitive as they age in the patriarchal society, they become less competitive around puberty in the matrilineal society. The regression shows that these across-society differences for girls' and boys' competitiveness as they age are significant at $p = 0.03$ for boys and marginally significant at $p = 0.08$ for girls.

An important question here is whether the decisions of girls and boys are optimal given their performance or whether culture leads them to make choices that would be unwise from a monetary payoff perspective. In order to analyze the optimality of decisions, following Niederle and Vesterlund (2007), we simulate the win and tie probabilities for each performance level by using the empirical performance distribution and drawing random pairs of opponents from the same culture 1000 times with replacement. We then calculate the expected payoff of each subject under the tournament, conditional on their realized performance, and study whether tournament entry is ex-post optimal for the subject.[12] Classifying decisions as "correct," indicating "under-entry" and indicating "over-entry," we find the patterns presented in table 2. We find that the decline in competitiveness observed in older girls in the matrilineal society is largely not rational from an ex-post payoff perspective. Girls in this group under-enter the tournament 62.5% of the time and otherwise make the correct decision, never over-entering. For older girls in the matrilineal society, in contrast, the frequency of under-entry is only 28.6%.

To explore the robustness of our main results, we also (in unreported regressions) run linear probability models using age as a continuous variable instead of age group dummies. We allow for village-

[11] The difference is significant only at the 10% level in a one-sided test of proportions.

[12] Our payment structure is such that if the subject enters the tournament, conditional on winning the tournament, a successful throw earns three times the piece-rate payment, while a successful throw earns the piece-rate payment if there is a tie. For a risk-neutral subject, entering the tournament is optimal if $\Pr(\text{win})3x + \Pr(\text{tie})x > x$, that is, $3\Pr(\text{win}) + \Pr(\text{tie}) > 1$.

TABLE 2.—OPTIMALITY OF CHOICES

	7–12 Years Old		13–15 Years Old		All	
	Under	Over	Under	Over	Under	Over
Patriarchal girls	47.46% [28]	22.03% [13]	62.50% [10]	0% [0]	50.67% [38]	17.33% [13]
Patriarchal boys	32.14% [18]	33.93% [19]	26.67% [4]	20% [3]	30.99% [22]	30.99% [22]
Matrilineal girls	14.52% [9]	35.48% [22]	28.57% [4]	28.57% [4]	17.11% [13]	34.21% [26]
Matrilineal boys	12.66% [10]	44.30% [35]	11.76% [2]	17.65% [3]	12.50% [12]	39.58% [38]
All	25.38% [65]	34.77% [89]	32.26% [20]	16.13% [10]		

Under- and over-entry error proportions within groups defined by age, gender, and society. Number of observations corresponding to each type of error in brackets.

level effects and control for school grade, gender of experimenter, and research assistant running the session as well. None of these controls or specifications alters the main result. In addition, and in order to explore any possible effects of the undersampling of post-puberty children in our data, we revisited two of the villages in 2009, recruiting more teens. Acknowledging that we might have contaminated behavior by returning to the same villages, we do not include this data in our main analyses, though they confirm our results. Figure B1 and table B1 in appendix B display the competition patterns over age with the addition of these data. Overall, our analyses confirm that there is no difference in competitive behavior across gender and culture for younger children, but a significant gender competition gap emerges among the older children in the patriarchal society but not the matrilineal society.

The differences we observe in children's behavior can be contrasted with the behavior of adults in these societies, as reported in Gneezy et al. (2009), who find essentially the same results as we find with the older children: adult men in the patriarchal society choose to compete more than women in the same society, while in the matrilineal society, they do not.

Our findings are interesting in comparison to some other work on the propensity of young people to compete. Gneezy and Rustichini (2004) compared the speed of 10- and 11-year-olds in running alone and running side by side with another child during a physical education class in Israel. They report that girls were not affected by running next to another child, but boys invested more effort (ran faster) when they were matched. Several recent experiments tested this finding in other countries. Dreber, Essen, and Ranehill (2011) find that 7- to 10-year-old boys and girls in Sweden have similar reactions in terms of performance to competition in running, skipping rope and dancing tasks. Likewise, Khachatryan (2011) finds similar performance and competition rates across gender in several tasks in Armenia. On the other hand, Sutter and Rützler (2010) find that boys choose to compete more (in math and running tasks) across all ages in a sample of 3- to 18-year-old Austrian children. These studies lend further support to the hypothesis that culture and social structure are important determinants of the gender gap in competitiveness over age.

V. Conclusion

In most cultures, men are more likely to have a successful career outside the household than women. This has been attributed to men being more competitively inclined due to nature, or nurture, or both. An important open question in understanding the sources of the gender gap in competitiveness is at what stage the difference first arises and whether this interacts with the socialization process. We show that girls become less competitive and boys more competitive around puberty in a patriarchal society, whereas this difference never arises in the matrilineal society.

While our results highlight a strong role for culture and socialization, it is important to note the possibility that socialization might act along with biological forces in determining the difference between the matrilineal and patriarchal societies around puberty. According to the gender intensification theory in psychology (Hill & Lynch, 1983), the physical changes of puberty reinforce socialization agents to increase pressure for sex-typed behavior (Rose & Rudolf, 2006).[13]

Apart from improving our understanding of basic human tendencies, this finding could also help in guiding public policies. While providing a recommendation on which specific policy should be adopted to reduce the gender gap is outside the scope of this paper, the results imply that such policies should be designed with a special focus on children around puberty, since this is the period in which the gap seems to be arising. Booth and Nolen (2009), for example, find evidence that girls in single-sex schools are more competitive and risk taking. If such a policy is to be undertaken, our findings suggest that it may not be necessary to implement it at the early childhood level but closer to the teenage period. Further research that studies the effects of different policies on girls and boys of different age is warranted to shed more light on these issues.

[13] Some research shows society's expectations might be working differently for males and females. While womanhood is a natural, constant state, males may be expected to display gender-typical behavior and performance in order to establish or continually prove their manhood, which may contribute to their higher competitiveness (Vandello et al, 2008).

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APPENDIX A

Instructions

Instructions

Welcome. Today you are going to play a game that takes 20 minutes. By playing the game, you have the chance to earn money. All the money you earn will be yours to keep. It will be paid to you, in private, after the game ends. No one will know how much money you earned, unless you choose to tell them yourself. Now we will explain the rules of the game. The rules are very simple. Pay very careful attention to these instructions because the better you understand them, the more money you can earn. Please do not talk with each other from this point on. If you have a question, you can raise your hand and ask. Otherwise, please be quiet and listen carefully just like you listen to your teacher in school.

The task that you will do is to throw this ball into this bucket from this line. (*Show them the ball, bucket, and line.*) You will have 5 chances to throw balls. Before you start throwing, you will be asked to choose between two ways of earning money:

Option 1 (Individual payment): If you choose this, you receive 10 rupees for each ball you throw in successfully. One ball in, you get 10 rupees; 2 balls in, you get 20 rupees; 3 balls, 30 rupees; and so on.

Do you have any questions?

Option 2 (Competition): If you choose this option, you will be competing with another kid. Every one of you will be matched with either a girl or a boy from another group who will be playing the same game (throwing balls). We will not tell you who the kid you will be competing with is. If you can throw more balls in than your opponent, you will win the competition. If you throw fewer balls in than your opponent, you will lose the competition. For example, if you throw in 3 balls successfully and your opponent throws 2 balls successfully, you win the competition and your opponent loses. If you throw in 3 balls successfully and your opponent 4 balls successfully, you lose the competition and your opponent wins. If you and your opponent make the same number of successful shots, it's a tie.

Now, if you choose to compete and you lose, you do not get any money. But if you win, you will be paid 30 rupees for every ball you got in, instead of 10. That is, for one successful throw, you will get 30 rupees. For 2 successful throws, you will get 60 rupees. For 3 successful throws, you will get 90 rupees and so on. But you will only receive this if you beat your opponent. If you do worse than your opponent, you get zero. If you both succeed the same number of times, it is a tie. In that case you will get 10 rupees for each successful throw.

Do you have any questions?

In a few minutes, we will take you inside to play this game. When you go inside, we will ask you privately which option you would like to choose. We will never tell anyone which option you chose. We are going to keep this as a secret even after the game is over.

Do you have any questions? Now, let's see if we all understand:

(Ask control questions to the whole group.)

- "If I choose the individual payment (that is, if I do not choose competition) and I throw in 3 balls successfully, how many rupees do I get?"
- "If I choose to compete and I throw in 3 balls successfully and my opponent makes 2 balls, how many rupees do I get?"
- "If I choose to compete and I throw in 4 balls successfully and my opponent throws in 5 balls, how many rupees do I get?"

Do you have any questions?

Okay, we will now take you inside to play the game and make your choices.

APPENDIX B

Additional Data

FIGURE B1.—POOLING DATA FROM REVISITED VILLAGES

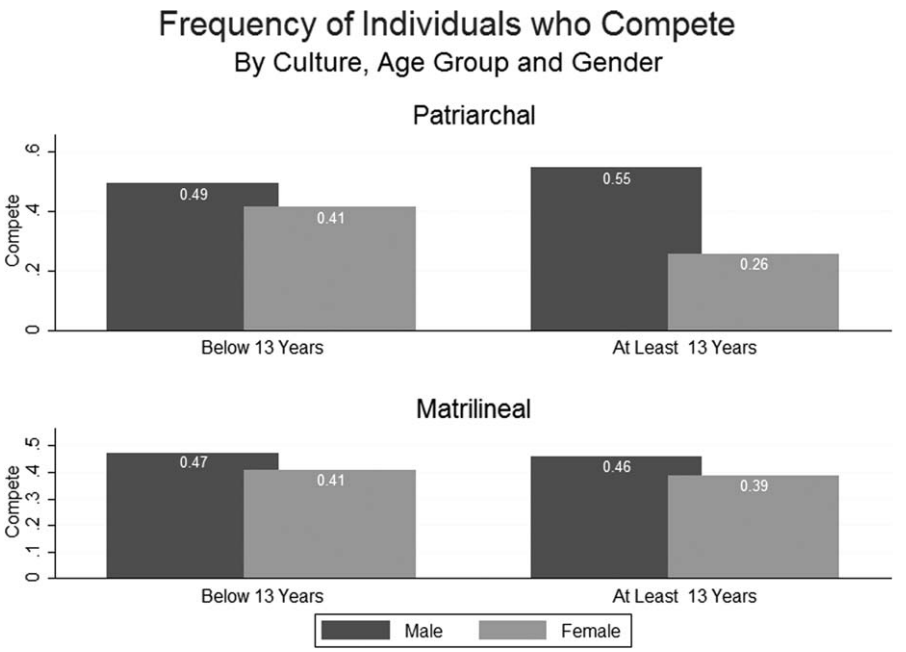


TABLE B1.—FREQUENCY OF COMPETITIVE CHOICES, INCLUDING DATA FROM REVISITED VILLAGES

	7–12 Years Old	13–18 Years Old	All
Patriarchal girls	0.413 (0.06)	0.255 (0.06)	0.352 (0.04)
	[75]	[47]	[122]
Patriarchal boys	0.492 (0.06)	0.545 (0.08)	0.514 (0.05)
	[63]	[44]	[107]
Matrilineal girls	0.409 (0.05)	0.388 (0.07)	0.401 (0.04)
	[93]	[49]	[142]
Matrilineal boys	0.474 (0.05)	0.46 (0.06)	0.469 (0.04)
	[114]	[63]	[177]
All	0.446 (0.03)	0.414 (0.04)	
	[345]	[203]	

Means as main number, standard errors in parentheses, and number of observations in brackets.

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