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Kinship structure, stress, and the gender gap in competition☆

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A B S T R A C T

While women generally prefer to compete less than men, cultural practices and physiological responses to competition may affect willingness to compete. I examine how kinship structure and stress affect the gender gap in willingness to compete in a lab experiment among individuals from 27 ethnic groups along the matrilineal belt in Central Africa. I find no evidence that matrilineal kinship relative to patrilineal kinship closes the gender gap in competition: 80% of men and 60% of women choose to compete with no differential effect across kinship systems. Using physiological data, I find that women who experience greater stress during competition are less likely to choose to compete.

1. Introduction

It is well documented that women generally prefer to compete less than men (Niederle, 2016). An exception is evidence from a series of papers comparing individuals from a matrilineal ethnic group to individuals from a patrilineal ethnic group, which find that the matrilineal system closes the gap in preference for competition (e.g. Andersen et al., 2013; Gneezy et al., 2009). These papers suggest that culture may be an important mediating factor for determining preference for competition.

There is a growing interest in understanding how culture shapes economic outcomes, particularly the outcomes of men relative to women. This interest stems from the recognition that, across many societies, there is a gender gap in outcomes such as female labor force participation, wages, and well-being, but there also exists substantial variation in these gaps. Recent work in economics has established that differences in culture can explain some differences in outcomes across gender (see e.g. Alesina et al., 2021; Ashraf et al., 2020; Bertrand et al., 2015; Fernández and Fogli, 2010; Giuliano, 2007, 2017; Gneezy et al., 2009; Jayachandran, 2015). While this insight is intuitive and compelling, improving our understanding of the relationship between culture and economic outcomes will require precisely defining the cultural trait of interest and using variation in cultural practices across societies in a similar geographic and institutional setting.[1]

A key social institution in many societies is a kinship system. *Kinship systems* determine group membership and social obligations to group members. In *matrilineal* kinship systems, lineage and inheritance are traced through female members,

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[1] The intuition is similar to the epidemiological approach suggested by Fernández (2011), who recommends studying individuals located in the same institutional and economic environment but with different cultures.

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while in *patrilineal* systems, male members determine descent and inheritance. Matrilineal kinship may affect preference for competition for several reasons. For example, the structure of kinship systems alters the relative role of women (Radcliffe-Brown, 1950; Gluckman, 1963; Richards, 1950; Douglas, 1969; Schneider and Gough, 1961). It also affects the extent to which women participate in agriculture (Aberle, 1961; Ember, 1983), the external resources they have access to, and their bargaining power within the household (Whyte, 1978; Schlegel, 1972). While matrilineal systems are not the same as *matriarchy*, in which women hold positions of power and authority, evidence suggests that matrilineal systems do have important implications for the well-being of women and children (e.g. Lowes, 2018).

I examine how matrilineal kinship systems relative to patrilineal kinship systems affect preference for competition. I collect data from 614 matrilineal and patrilineal individuals located in Kananga, a city on the edge of the "matrilineal belt" in the Democratic Republic of the Congo (DRC). Although matrilineal societies are present across the world (see Figure A1), Central Africa has the highest density of matrilineal kinship systems. Additionally, it has many matrilineal societies located alongside patrilineal societies. Thus, it is a natural place to study the effect of matrilineal kinship on economic outcomes.

Individuals in the sample are from 27 different ethnic groups, and approximately 39% of the sample is matrilineal. I measure preference for competition and willingness to take risks with incentivized lab experiments. Following Niederle and Vesterlund (2007), individuals complete a task under piece rate pay (payment for each completed task), tournament pay (payment if the participant completes the task more times than another randomly selected individual), and under a payment scheme of their choice. Preference for competition is measured by choosing tournament pay when given a choice of payment scheme. To measure willingness to take risks, individuals choose between various incentivized gambles.

I find several key results. First, in line with a large literature that documents that women are less inclined to compete than men (Gneezy et al., 2003; Niederle and Vesterlund, 2007), I find that women are approximately 21 percentage points less likely to choose to compete in the experiment, despite being equally capable at the experimental task. This is in a setting where 80% of men and 60% of women choose to compete. As a point of reference, in Niederle and Vesterlund (2007), 35 percent of women choose to compete relative to 73 percent of men. Thus, while there is a gender gap in competition, some women and some men are over-competing.

I find no evidence that matrilineal kinship reduces the gender gap in competition. The coefficient for matrilineal kinship on women's preference for competition is close to zero, often negative, and not significant. The estimated effects do not differ by age cohort nor do they differ by whether an individual was born in Kananga or socialized in a rural setting. This is not to say that matrilineal kinship has no meaningful effect on economic decision making. In fact, in other work in the same setting (Lowes, 2018), I document that matrilineal kinship has important effects on spousal cooperation, incidence of domestic violence, and the education and health of children.

A benefit of this setting is that there are multiple matrilineal and patrilineal groups. This allows me to examine whether it is possible to generate a positive and significant effect of matrilineal kinship on women's willingness to compete when comparing one matrilineal group to one patrilineal group. I estimate the effects for each combination of matrilineal and patrilineal group and present the associated t-values and beta coefficients. I find that only when comparing one matrilineal group to one patrilineal group for groups for which I have few observations is it possible to generate a significant positive effect of matrilineal kinship on women's willingness to compete. However, the entire distribution of effects with these single group comparisons suggest a failure to reject the null hypothesis – that matrilineal kinship does not have an effect on women's willingness to engage in competition. This may indeed be informative on how matrilineal kinship affects women's preference for competition.[2]

Although I find no evidence that matrilineal kinship closes the gap in preference for competition, I do find that many of the other key results in the literature on women's willingness to compete hold in this setting (see e.g. Niederle, 2016; 2017). I examine how performance during the tournament round, beliefs about performance in the tournament round, overconfidence, and preference for risky gambles affect choice to compete. I find that actual performance during the tournament round and beliefs about performance positively predict willingness to compete. However, women's choice to compete is much less responsive to having positive beliefs about their performance.

I also examine overconfidence, measured as the difference between beliefs about relative ranking in performance and actual ranking. Individuals are on average overconfident, believing that they performed better relative to their peers than they actually did. There is no significant gender gap in overconfidence in the assessment of relative ranking for the piece rate round, but men are significantly more overconfident in their performance in the tournament round. Controlling for overconfidence partially explains the gap in willingness to compete.

I also explore how risk preferences affect choice to compete. Individuals in the sample complete a series of incentivized choices over risky gambles. I find that willingness to choose riskier gambles is positively correlated with choosing competition, but that controlling for willingness to take risks does not reduce the gender gap in willingness to compete. However, matrilineal kinship completely closes the gender gap in preference for risk taking. This is in line with other work that has examined the role of matrilineal kinship and preference for risk taking in China (Gong and Yang, 2012).

Finally, I collect physiological data during game play. Specifically, I measure changes in electrodermal activity (EDA), a physiological response often associated with stress, during the various rounds of the task. There are several benefits to the collection and analysis of physiological data. First, because EDA responses are a product of the sympathetic nervous

[2] See Abadie (2020) for a discussion of when failure to reject can be informative.

system, they are involuntary and cannot be manipulated by the respondent. Thus, they are not subject to experimenter demand effects. Second, EDA has been been shown in previous research to be a reasonable measure of anticipatory anxiety and stress in an experimental task (Boucsein, 1992). Thus, by collecting EDA data, I am able to explore if individuals have different physiological responses to a task and how these responses predict subsequent behavior. Additionally, I can examine whether culture – in this case, kinship structure – mediates the stress response to competitive tasks.

I construct a measure of skin conductance level (SCL) during a baseline period, the piece rate round, and the tournament round of the task. For each individual, I normalize the SCL in the piece rate and tournament rounds by baseline skin conductance, to account for differences across individuals in levels of skin conductance. I then construct a measure of change in the skin conductance level between the tournament round and the piece rate round. A positive number indicates a higher skin conductance level in the tournament round relative to the piece rate round.

I find no significant differences in the standardized SCL between men and women across the various rounds. I find that for men there is a positive effect of increased stress in the tournament round relative to the piece rate round on choice of competition. However, despite similar physiological reactions, women who experience an increase in their skin conductance level in the tournament round relative to the piece rate round are less likely to choose competition. Controlling for change in skin conductance level and the interaction term between female and change in skin conductance level reduces the coefficient on female for choosing competition by 30%. If I split the sample by above and below median SCL response, I find a significant and large gender gap in preference for competition among those with an above median SCL response and an insignificant and greatly reduced gender gap among those with a below median SCL response. I find no evidence of a differential effect of increases in stress on women's choice to compete across kinship systems.

This paper contributes to several literatures. A large literature in experimental economics documents that women are less inclined to compete than men (e.g. Gneezy et al., 2003; Niederle and Vesterlund, 2007). This result has been replicated across a variety of settings (Niederle, 2016).[3] The gender gap in competitive preference has been used to explain why we observe large gender gaps in choice of educational track, wages, and in career paths (Almås et al., 2016; Buser et al., 2014; 2017b; Reuben et al., 2021). I replicate many of the key results in this literature in a new cultural setting. This is particularly important given work by Henrich et al. (2010), that demonstrates that using samples of students from Western societies may not reflect human behavior more broadly.

Interest in matrilineal kinship in economics has grown due to work by Gneezy et al., 2009 who study the Maasai, a patriarchal, patrilocal, and patrilineal society in East Africa, and the Khasi, a matriarchal, matrilocal, and matrilineal society in India. Their paper makes the important contribution of demonstrating that women do not always prefer to compete less than men and that variation in cultural practices such as matrilineal kinship may mediate women's preference for competition. I build on their contribution by focusing on the role of matrilineal kinship. The groups in my sample are matrilineal, but, unlike the Khasi, are not matriarchal and do not practice matrilocal residence. Second, I work in an environment with variation in the cultural practice of interest at the ethnic group level and where much of the world's matrilineal groups are located.[4]

Since the work of Gneezy et al., 2009, a series of papers have measured various preferences of individuals from a matrilineal group and a patrilineal group to document how differences in culture affect a variety of outcomes. These papers have examined variation in: preference for competition across age groups (Andersen et al., 2013), spatial reasoning (Hoffman et al., 2011), pro-social behavior (Gong et al., 2015), preference for risk (Gong and Yang, 2012), and institutions (Zhang, 2019).[5]

This paper builds on this past work in several ways. First, the ideal test of whether kinship systems affect women's preference for competition would compare groups in a similar setting that differ only in their practice of matrilineal or patrilineal kinship. I present evidence on preference for competition from individuals from matrilineal and patrilineal ethnic groups who live along the edge of the matrilineal belt. Historically, individuals from these groups shared ecologically similar environments and histories. The sample is from a major urban area along the matrilineal belt so that individuals presently face a similar institutional and cultural environment (Fernández, 2011). Additionally, there are many different ethnic groups in a similar geographic setting, so the observed effect of kinship practice is not specific to one ethnic group. I collect a rich set of demographic and experimental measures that allow me to control for other possible differences across individuals in these groups, such as risk preferences. I am also able to control for group level characteristics, such as residence patterns

[3] Related research by Cassar et al. (2016) and Cassar and Zhang (2021) finds that women's preference for competition is sensitive to the reward type (e.g. cash relative to goods for children).

[4] A related strategy is pursued by Andersen et al. (2013), who work with individuals from multiple villages from a matrilineal society and a patriarchal society in India.

[5] For example, Andersen et al. (2013) compare a matrilineal and patrilineal group in India and find that a gender gap in willingness to compete emerges after puberty. Hoffman et al. (2011) find no differences in spatial ability between men and women among the matrilineal Khasi in India, whereas they find that men perform better at a spatial task among the neighboring patrilineal Karbi. Gong and Yang (2012) find a smaller gender gap in risk preference for the matrilineal Mosuo in China relative to the patriarchal Yi, and Gong et al. (2015) find that women in the Mosuo ethnic group are less generous relative to men, while there is no difference for the patriarchal Yi. Zhang (2019) examines differential response to changes in institutions encouraging women's participation in the labor force across a matrilineal and two patrilineal groups in China. The patrilineal group that is exposed to the government reforms demonstrates no significant gender gap. Flory et al. (2017) compare preference for competition among individuals from matrilocal villages and from patrilocal villages in Malawi. They find no gender gap in preference for competition among matrilocal women and that patrilocal women's willingness to compete is sensitive to having children.

and marriage payments. My results suggest that it is important to precisely define the cultural feature of interest as well as to study subjects in a similar geographic and institutional setting.

I also add to a literature from anthropology and psychology on how social structures shape socialization and women's position in society (Aberle, 1961; Schlegel, 1972; Whyte, 1978). For example, this literature explores how modes of production (e.g. reliance on horticulture) affect gender differences in socialization and work and play for children (Ember, 1983; Ember and Cunnar, 2015). The presence of competitive sports and women's participation in sports also varies across societies (Schlegel and Barry, 1989), with evidence that in more patriarchal cultures women are less likely to participate in sports (Deaner and Smith, 2013).

Additionally, this paper presents novel evidence that physiological responses while competing predict subsequent choice of competition. There is limited evidence on physiological responses and behavior during lab experiments. Related work by Buser et al. (2017a) finds that competition causes an increase in cortisol levels among a sample of Harvard students; increases in cortisol are positively correlated with competition for women, but there is no correlation for men. Lowes (2018) examines EDA responses across matrilineal and patrilineal individuals to participating in a bargaining task with a spouse and with a stranger of the opposite sex. Matrilineal individuals experience greater stress relative to patrilineal individuals when paired with their spouse but not when paired with a stranger of the opposite sex. I find that women's physiological response during the competition task is an important predictor of their choice to compete.

The paper is also related to a large literature on the cultural determinants of the status and preferences of women. Large gaps in outcomes between men and women exist in many developing countries (Bertrand, 2010; Jayachandran, 2015; Alesina et al., 2021; Bloch and Rao, 2002; Bobonis et al., 2013). Cultural practices have been linked to these gaps in outcomes (Jayachandran, 2015; Alesina et al., 2013; 2021; Ashraf et al., 2020; Bau, 2021), with a particular and growing interest on the role of kinship systems (Brulé and Gaikwad, 2021; Gottlieb and Robinson, 2021; Jayachandran and Pande, 2017; La Ferrara, 2006; La Ferrara and Milazzo, 2017; Lowes). I present evidence that, at least for the many matrilineal groups located in Central Africa, matrilineal kinship does not close the gender gap in preference for competition. This does not mean that matrilineal kinship has no meaningful benefits for women, but that matrilineal kinship alone does not increase willingness to compete in a setting where matrilineal and patrilineal individuals live in close proximity and share a common institutional environment.

2. Setting and data

2.1. Setting

The experimental setting is the DRC, which has many different ethnic groups with diverse cultural practices. In particular, there is variation in the type of kinship system practiced. Kinship systems determine how families trace group membership and thus the set of people to whom an individual considers themself related and to whom they have obligations. Anthropologists have long studied the implications of kinship systems and other social structures for gender norms, but economists are just recently exploring how they matter for the well-being of women.

In sub-Saharan Africa, about 15% of surveyed societies in the Ethnographic Atlas practice matrilineal kinship and 70% practice patrilineal kinship. The majority of the matrilineal groups are found in the "matrilineal belt," which describes the distribution of matrilineal societies across central Africa. The matrilineal belt intersects Angola, the Republic of Congo, DRC, Gabon, Malawi, Mozambique, Namibia, Tanzania, and Zambia, as shown in Fig. 1. Historically, matrilineal kinship in Africa is associated with greater practice of avunculocal residence (residing with the husband's maternal uncle) after marriage rather than patrilocal residence (residing with the husband's father's household), less plough use, and less animal husbandry.[6] There are no significant differences in the practice of bride price and bride service in the Ethnographic Atlas (Murdock, 1967). Presently, among individuals in the sample, there is no differential practice of avunculocal residence (almost all practice neolocal residence) or payment of bride price (everyone pays bride price).

There is conflicting evidence on the origins of matrilineal kinship systems. Hypotheses from evolutionary anthropology link the existence of matrilineal systems to the ecological and social environment. For example, Aberle (1961) suggests that hoe agriculture is more compatible with matrilineal kinship; matrilineal kinship may be more favorable in an environment with low paternal certainty (Fortunato 2012) or when there is less moveable heritable property (such as cows) (Holden and Mace, 2003). For a more in depth overview of the origins of matrilineal kinship systems, the structure of matrilineal kinship systems, and the historical and present day correlates of matrilineal kinship, see Lowes (2018).

Across matrilineal societies, an important source of variation is the extent to which authority is allocated to brothers relative to husbands (Schlegel, 1972). Schlegel hypothesizes that as domestic power disperses (e.g. across brothers and husbands) it declines. Fox (1967, p. 113) presents a related typology of three types of matrilineal kinship systems, with varying levels of women's empowerment. The first type of matrilineal society is based on mother-daughter-sister roles and has matrilocal residence. In this case, women control the continuity of the matrilineage and resources, and thus tend to have

[6] Interestingly, matrilocal residence (in which the husband moves to the wife's mother's household) is very rare among matrilineal groups in Africa (Murdock, 1959, p. 39); of the groups in Africa represented in the Ethnographic Atlas, less than 3% practice matrilocal residence (Murdock, 1967). Among the ethnic groups represented in my sample, none practice matrilocal residence and two practice uxorilocal residence (husband moves to the wife's residence) alongside other residence patterns (Vansina, 1966).

Fig. 1. Ethnic group boundaries and matrilineal belt.

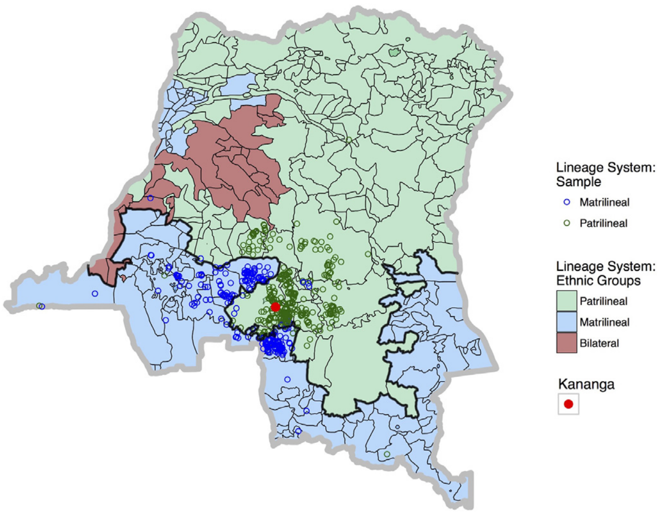

Fig. 2. Matrilineal belt and villages of origin for sample.

relatively higher status (note, this is most similar to the Khasi studied in Gneezy et al., 2009). In the second type of matrilineal society, the emphasis is on the brother-sister-nephew roles. They often practice avunculocal residence and political power is generally monopolized by men. This results in relatively lower status of women. Finally, a third type emphasizes all of the above relationships. In this type men remain in control, but the status of women is not as low as in the second type. In the DRC, the matrilineal groups are primarily of the second type, in which men retain much of the authority and control of resources.

2.2. Data collection

Data collection took place in 2015 in the DRC. Individuals were selected for participation in the study using both random and targeted sampling methods within the city of Kananga. The sample comprises 307 married couples for a total of 614 individuals, of whom 61% are from patrilineal groups and 39% are from matrilineal groups. The sample includes individuals from 27 different ethnic groups, 13 of which are matrilineal. The largest patrilineal groups represented in the sample are the Luluwa, Luntu, Luba, Tetela, Songe, and Bindi, and the largest matrilineal groups represented in the sample are the Kuba, Sala, Mbala, Kete, Lele, and Chokwe. For the distribution of ethnic groups, see Appendix Table A1. Fig. 2 is a map of the locations of the villages of origin for the sample and the location of the field site, Kananga.

Table 1
Summary statistics.

	All participants			
	Matrilineal	Patrilineal	SE	(p-value)
Age	39.436	41.617	1.209	0.072
Age Married	23.162	22.853	0.579	0.593
Age Lived with Spouse	23.224	22.842	0.560	0.495
Number of Marriages	1.108	1.182	0.037	0.045
Number of Wives	1.017	1.043	0.017	0.118
Matrilocal	0.054	0.051	0.018	0.870
Paid Bride Price	0.992	0.992	0.007	0.973
Years Education	11.058	9.432	0.339	0.000
Employed	0.701	0.684	0.038	0.646
Weekly Income	29.770	25.275	3.029	0.138
Savings	0.419	0.340	0.040	0.049
Observations	241	373		
	Men only			
	Matrilineal	Patrilineal	SE	(p-value)
Age	42.467	46.043	1.656	0.032
Age Married	26.811	26.789	0.802	0.978
Age Lived with Spouse	26.951	26.676	0.771	0.721
Number of Marriages	1.180	1.292	0.067	0.096
Number of Wives	1.033	1.086	0.033	0.105
Matrilocal	0.041	0.043	0.024	0.924
Paid Bride Price	0.992	1.000	0.007	0.219
Years Education	13.148	10.751	0.451	0.000
Employed	0.918	0.886	0.035	0.371
Weekly Income	35.791	29.722	5.167	0.241
Savings	0.377	0.346	0.056	0.580
Observations	122	185		
	Women only			
	Matrilineal	Patrilineal	SE	(p-value)
Age	36.328	37.261	1.643	0.571
Age Married	19.420	18.979	0.544	0.418
Age Lived with Spouse	19.403	19.069	0.517	0.518
Number of Marriages	1.034	1.074	0.028	0.139
Matrilocal	0.067	0.059	0.028	0.758
Paid Bride Price	0.992	0.984	0.013	0.571
Years Education	8.916	8.133	0.424	0.066
Employed	0.479	0.484	0.059	0.932
Weekly Income	23.597	20.899	3.053	0.378
Savings	0.462	0.335	0.057	0.026
Observations	119	188		

Notes: Age is the individuals current age. *Age Married* is the individual's age at marriage. *Age Lived with Spouse* is age at which the individual first began living with their spouse. *Number of Marriages* is the number of times the individual has been married. *Number of Wives* is the number of wives a man has currently (if polygamous). *Matrilocal* is whether the individual reports having lived with the wife's family after marriage. *Bride Price Paid* is whether the individual reports a bride price was paid at the time of marriage. *Years Education* is the number of years of education the individual has completed. *Employed* is a indicator variable equal to 1 if the individual is currently employed. *Weekly Income* is the individual's personal weekly income in dollars. *Savings* is an indicator variable equal to 1 if the individual has a savings account of some sort (formal or informal).

Table 1 presents summary statistics for the sample by sex and by kinship system. Patrilineal men are slightly older than matrilineal men. Matrilineal individuals are on average better educated than patrilineal individuals. This is the case for both men and women. Matrilineal women are also more likely to have a savings account. Across other key variables, such as practice of matrilocal residence after marriage, payment of bride price, and employment, there are no significant differences between matrilineal and patrilineal individuals.

Individuals are interviewed by an enumerator of the same sex in either French or Tshiluba, the languages spoken in this area of DRC.[7] While the majority of the sample complete the experiment at their homes in the privacy of a tent (442 participants), a subset of the sample was invited to a laboratory to complete the experiment (172 participants). The lab is set up to allow for the collection of physiological data during game play. Participants wear devices designed to record

[7] Tshiluba is the regional language. All but one respondent reported fluency in either Tshiluba or French.

Table 2
Summary of matching game rounds.

Round	Description of round	Payment description	Measure
1	Complete memory task for *piece rate pay*	200 CF per completed memory game in round 1.	Performance under piece rate pay.
2	Complete memory task for *tournament pay*	Randomly matched to another player; If completed more rounds of game in round 2 than the randomly chosen opponent in round 2, 500 CF per completed game; 0 otherwise.	Performance under tournament pay.
3	*Choice of piece rate pay or tournament pay*, then complete memory task	If tournament pay is chosen, match player's performance in round 3 to randomly chosen opponent's performance in round 2 Otherwise, piece rate for round 3 performance.	Preference for competition and subsequent performance.
4	*Choice of piece rate pay or tournament pay*	If tournament pay is chosen, match player's performance in round 1 to randomly chosen opponent's performance in round 1. Otherwise, piece rate for round 1 performance.	Preference for competition; remove uncertainty over performance.

physiological responses while making their experimental decisions. These devices record data on heart rate, electrodermal activity, temperature, and movement.

2.3. Experimental design

The experimental design closely follows Niederle and Vesterlund (2007), in which individuals complete a task under piece rate pay, tournament pay, and under the payment scheme of their choice. In Niederle and Vesterlund (2007), the experimental task required individuals to add sets of five two-digit numbers. However, given that the context is quite different from the United States and that there are lower levels of education, I constructed a different task for individuals to complete.[8]

The experimental task is a matching game completed on a touchscreen tablet. In the matching game the respondent sees 16 cards on the tablet screen for approximately 5 seconds. The cards have images of various animals. There are 2 cards with each animal image, for a total of eight matching pairs of cards. The cards are then flipped over so that the animal images are no longer revealed. The respondent can then select two different cards at a time to reveal the animal images, with the goal of identifying the pairs of cards with the matching animal images. If the respondent selects two matching cards, the cards disappear from the screen. If the respondent selects two cards that do not match, then the cards are once again flipped over so that the animal images are no longer revealed. Once all of the matching pairs have been identified, the game is complete, and the respondent begins the game again. The respondent is told to complete the game as many times as they can in five minutes. Performance is measured based on the number of times the game is completed within the five minute time period. See Figure A2 for screen shots of the matching game with the animal images revealed and hidden.

There were several key considerations when choosing the experimental task. Most importantly, in this context, the task needed to be accessible to individuals across education levels. Additionally, an appropriate task would not favor one gender over the other and would not be particularly associated with one gender. I test whether the chosen experimental task favors men or women. Table 3 Panels A and B suggest that men and women are equally good at the task.

Prior to beginning the experimental rounds, the respondent completes a practice round of the game. After successfully completing the practice round, participants complete three five-minute rounds of the experimental task. A fourth round consists of a choice of payment scheme for performance in the first round. Participants are told that one of the four rounds are randomly selected, and that they are paid based on their performance and choices in that round.

In the first round of the task, participants are told that performance is paid *piece rate*, by the number of completed matching games within five minutes. For each completed game they are paid 200 CF (approximately $0.20; the minimum wage is CF 1680 a day). A completed matching game means that the individual correctly matches all of the pairs of identical cards. For example, if an individual completes the matching game three times during the 5 minute time period for round 1, they receive a payout of 600 CF if this round is chosen for payout. This round will be referred to as the *piece rate round*.

In the second round of the game, participants are told they will be matched with another randomly chosen individual. The researcher compares the number of completed games between the two individuals. Whichever participant completes

[8] The math exercises would have been quite difficult in a low education environment. In Gneezy et al., 2009, participants threw balls into a container. The ball throwing exercise seemed to favor men, who are more likely to participate in sports in this context. Flory et al. (2018) ask participants to arrange wooden blocks stamped with shapes of different sizes by shape and size.

Table 3
Performance in rounds 1 and 2 and chose competition.

	Panel A: OLS, Dep. Var.: Games Completed in Round 1					
	By Gender		By Matrilineal		By Gender and Matrilineal	
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.336	−0.047	−0.325	−0.066	−0.335	−0.117
	(0.177)*	(0.191)	(0.176)*	(0.192)	(0.222)	(0.229)
	(0.211)	(0.235)	(0.209)	(0.239)	(0.282)	(0.291)
	(0.184)*	(0.217)	(0.183)*	(0.212)	(0.222)	(0.226)
Lab	−2.109	−2.118	−2.150	−2.148	−2.150	−2.148
	(0.152)***	(0.147)***	(0.152)***	(0.149)***	(0.152)***	(0.149)***
	(0.163)***	(0.155)***	(0.165)***	(0.159)***	(0.165)***	(0.159)***
	(0.156)***	(0.141)***	(0.157)***	(0.144)***	(0.157)***	(0.144)***
Years Education		0.077		0.070		0.071
		(0.023)***		(0.023)***		(0.023)***
		(0.023)***		(0.022)***		(0.022)***
		(0.024)***		(0.024)***		(0.025)***
Matrilineal			0.401	0.301	0.389	0.233
			(0.170)**	(0.171)*	(0.228)*	(0.231)
			(0.177)**	(0.174)*	(0.289)	(0.290)
			(0.189)**	(0.182)	(0.286)	(0.298)
Matrilineal*Female					0.024	0.135
					(0.336)	(0.336)
					(0.352)	(0.357)
					(0.314)	(0.339)
Wild Bootstrap *p*-Value for:						
Cluster 1: Female	0.135	0.858	0.165	0.798	0.303	0.719
Cluster 1: Matrilineal			0.0339	0.105	0.216	0.472
Cluster 2: Female	0.135	0.838	0.147	0.763	0.300	0.631
Cluster 2: Matrilineal			0.0440	0.0440	0.210	0.210
Mean Dep. Var.	5.383	5.383	5.383	5.383	5.383	5.383
	Panel B: OLS, Dep. Var.: Games Completed in Round 2					
	By Gender		By Matrilineal		By Gender and Matrilineal	
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.131	0.253	−0.123	0.245	−0.145	0.167
	(0.165)	(0.178)	(0.164)	(0.179)	(0.213)	(0.217)
	(0.173)	(0.210)	(0.175)	(0.212)	(0.230)	(0.245)
	(0.145)	(0.206)	(0.146)	(0.203)	(0.170)	(0.199)
Lab	−1.695	−1.707	−1.722	−1.719	−1.722	−1.719
	(0.148)***	(0.143)***	(0.147)***	(0.143)***	(0.147)***	(0.143)***
	(0.139)***	(0.133)***	(0.142)***	(0.136)***	(0.142)***	(0.135)***
	(0.141)***	(0.122)***	(0.148)***	(0.128)***	(0.148)***	(0.128)***
Years Education		0.103		0.100		0.101
		(0.022)***		(0.023)***		(0.023)***
		(0.022)***		(0.022)***		(0.022)***
		(0.024)***		(0.023)***		(0.024)***
Matrilineal			0.259	0.116	0.233	0.010
			(0.158)	(0.161)	(0.210)	(0.217)
			(0.161)	(0.168)	(0.240)	(0.252)
			(0.181)	(0.168)	(0.250)	(0.263)
Matrilineal*Female					0.053	0.211
					(0.319)	(0.317)
					(0.335)	(0.345)
					(0.312)	(0.353)
Wild Bootstrap *p*-Value for:						
Cluster 1: Female	0.467	0.260	0.497	0.288	0.560	0.549
Matrilineal *p*-Value Cluster 1			0.122	0.510	0.367	0.969
Cluster 2: Female	0.382	0.233	0.410	0.241	0.434	0.433
Matrilineal *p*-Value Cluster 2			0.164	0.164	0.388	0.388
Mean Dep. Var.	5.902	5.902	5.902	5.902	5.902	5.902
Observations	614	614	614	614	614	614
Clusters 1	48	48	48	48	48	48
Clusters 2	28	28	28	28	28	28

Notes: The standard errors are: robust, clustered at the ethnic group by gender level, and clustered at the ethnic group level. *p*-Value is the wild bootstrap *p*-value for clustering at the ethnicity by gender or ethnicity level for the stated coefficient. Controls for age and age squared. *Female* is an indicator variable equal to 1 if the respondent is a woman. *Lab* is an indicator variable equal to 1 if the respondent completed the experiment in the lab rather than in the field. *Years of Education* is the number of years of education the respondent has completed. *Matrilineal* is an indicator variable equal to 1 if the respondent is from an ethnic group that is matrilineal. *Games Completed* is the number of games completed during a 5 min round of the task. *Chose Competition* is an indicator variable equal to 1 if the respondent chose tournament pay in round 3 rather than piece rate pay. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

the most games receives 500 CF per completed game and the other player receives 0 CF.[9] The respondents are not told the gender of the individual with whom they are paired. In the case that both participants complete the same number of matching games within 5 minutes, a winner is randomly chosen. This round will be referred to as the *tournament round*.

In the third round of the game, the participants are able to choose how they are compensated if this round is chosen for payout: either with the piece rate scheme as in the first round or the tournament scheme as in the second round. As in Niederle and Vesterlund (2007), for those who chose the tournament scheme, their performance in round 3 is matched to another player's performance in round 2. This is to avoid concerns that individuals avoid choosing the tournament scheme because they feel bad affecting another player's payoffs.

In the fourth round, participants do not play the matching game again. Rather, they are asked to choose between piece rate pay and tournament pay for their performance in the piece rate round. Given that the participants already know how they performed during the piece rate round, their choice of payment scheme in this round reflects preference for competition once uncertainty over performance has been removed. The experimental rounds are summarized in Table 2.

3. Results

3.1. Empirical strategy

To examine the impacts of gender and matrilineal kinship systems on preference for competition, I estimate the following three parsimonious OLS specifications. First, to examine differences in gender only, I estimate:

$$y_i = \alpha + \gamma_1 Female_i + \mathbf{X}_i \boldsymbol{\beta} + \varepsilon_i \tag{1}$$

where y_i is the outcome of interest for individual i, such as whether the individual chose to compete; $Female_i$ is an indicator variable equal to one if the respondent identifies as a woman; and $\mathbf{X}_i$ is a vector of covariates for individual i such as age, age squared, an indicator for completing the experiments in the lab rather than in the field, or years of education. Eq. (1) is equivalent to much of the literature that examines the effects of gender on preferences. To estimate the impacts of gender and kinship system, but without accounting for any differential effects of kinship system by gender, I estimate:

$$y_{i,e} = \alpha + \gamma_1 Female_i + \gamma_2 Matrilineal_e + \mathbf{X}_i \boldsymbol{\beta} + \varepsilon_{i,e} \tag{2}$$

where $y_{i,e}$ is the outcome of interest for individual i from ethnic group e, and $Matrilineal_e$ is an indicator equal to 1 if ethnic group e practices matrilineal kinship. Finally, to examine differential effects of kinship system by gender, I estimate:

$$y_{i,e} = \alpha + \gamma_1 Female_i + \gamma_2 Matrilineal_e + \gamma_3 Matrilineal_e * Female_i + \mathbf{X}_i \boldsymbol{\beta} + \varepsilon_{i,e} \tag{3}$$

where I include a *Matrilineal* and *Female* interaction term. The tables are generally constructed with six columns to present results by gender (Eq. (1)), by kinship system (Eq. (2)), and by kinship system and gender (Eq. (3)). I present three sets of standard errors: robust standard errors, standard errors clustered at the ethnicity by gender level, and standard errors clustered at the ethnicity level. When I cluster by ethnicity by gender and by ethnicity, I also present wild bootstrapped p-values for the main coefficients of interest to address the concern that the small number of clusters is leading to an over-rejection of the null hypothesis.

3.2. Performance in task

To test whether the task favors men or women, I examine performance in round 1 (piece rate) and round 2 (tournament) of the task by gender. Table 3 suggests that men and women perform equally well at the task. Panel A presents the number of games completed during the 5 minutes for round 1, and Panel B presents the number of games completed during the 5 minutes for round 2. On average, individuals complete around 5.3 games in round 1 and 5.9 games in the round 2. In Panel A, the coefficient on female is consistently negative, suggesting that women may perform slightly worse during round 1, though the coefficient is not significant. There is some evidence that matrilineal individuals may perform better in round 1, though this is only marginally significant. Columns (2), (4), and (6) include a control for years of education. This is because education may affect performance on the task, and men and matrilineal individuals are better educated on average. In both rounds, more educated individuals perform significantly better. Additionally, I include an indicator variable for whether the individual completed the experiments in a lab, rather than in the field. Individuals perform worse in the lab relative to the field.

3.3. Choice of competition

Table 4 presents results on choice of competition in round 3, when individuals choose between piece rate payment and tournament payment. Approximately 72 percent of the sample chose to compete. The large number of individuals that

[9] Note, this is different from other settings where individuals are paired with multiple other players, e.g. groups of four. Here, an individual is paired with only one other player.

Table 4
Chose competition.

	OLS, Dep. Var.: Chose Competition					
	By Gender		By Matrilineal		By Gender and Matrilineal	
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.217	−0.200	−0.217	−0.198	−0.199	−0.184
	(0.037)***	(0.040)***	(0.037)***	(0.040)***	(0.046)***	(0.048)***
	(0.032)***	(0.036)***	(0.032)***	(0.036)***	(0.035)***	(0.040)***
	(0.033)***	(0.044)***	(0.033)***	(0.044)***	(0.041)***	(0.051)***
Lab	0.082	0.081	0.084	0.084	0.084	0.084
	(0.038)**	(0.038)**	(0.038)**	(0.038)**	(0.038)**	(0.038)**
	(0.036)**	(0.036)**	(0.036)**	(0.036)**	(0.036)**	(0.036)**
	(0.034)**	(0.034)**	(0.034)**	(0.034)**	(0.034)**	(0.034)**
Years Education		0.005		0.005		0.005
		(0.005)		(0.005)		(0.005)
		(0.005)		(0.005)		(0.005)
		(0.005)		(0.004)		(0.004)
Matrilineal			−0.016	−0.023	0.006	−0.005
			(0.036)	(0.037)	(0.046)	(0.047)
			(0.033)	(0.035)	(0.041)	(0.042)
			(0.034)	(0.033)	(0.040)	(0.037)
Matrilineal*Female					−0.045	−0.037
					(0.072)	(0.072)
					(0.067)	(0.066)
					(0.064)	(0.063)
Wild Bootstrap *p*-Value for:						
Cluster 1: Female	0	0	0	0	0.000200	0.000400
Cluster 1: Matrilineal			0.652	0.541	0.895	0.922
Cluster 2: Female	0	0	0	0	0.000800	0.000500
Cluster 2 Matrilineal			0.643	0.643	0.888	0.888
Mean Dep. Var.	0.715	0.715	0.715	0.715	0.715	0.715
Observations	614	614	614	614	614	614
Clusters 1	48	48	48	48	48	48
Clusters 2	28	28	28	28	28	28

Notes: The standard errors are: robust, clustered at the ethnic group by gender level, and clustered at the ethnic group level. *p*-Value is the wild bootstrap *p*-value for clustering at the ethnicity by gender or ethnicity level for the stated coefficient. Controls for age and age squared. *Female* is an indicator variable equal to 1 if the respondent is a woman. *Lab* is an indicator variable equal to 1 if the respondent completed the experiment in the lab rather than in the field. *Years of Education* is the number of years of education the respondent has completed. *Matrilineal* is an indicator variable equal to 1 if the respondent is from an ethnic group that is matrilineal. *Games Completed* is the number of games completed during a 5 minute round of the task. *Chose Competition* is an indicator variable equal to 1 if the respondent chose tournament pay in round 3 rather than piece rate pay. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

chose to compete suggests that there are many individuals who compete but that ought not be competing (since an individual should only choose to compete if they are better than the median player). Individuals who participate in the lab are more likely to compete; therefore in subsequent analyses I include this as a control variable. Women are approximately 22 percentage points less likely to compete than men. While the coefficient on female is consistently large, negative, and significant across the specifications, there are no significant differences in willingness to compete between matrilineal and patrilineal individuals nor between matrilineal women and patrilineal women.[10] The results are robust to controlling for residence patterns, using avunculocal residence as the treatment variable, and controlling for types of marriage payments (see Appendix Table A2).

3.4. Comparisons between one matrilineal group and one patrilineal group

One of the benefits of this setting is that there are multiple matrilineal and patrilineal groups. Therefore, I estimate the distribution of estimated effect sizes of matrilineal kinship on women's willingness to compete when comparing one matrilineal group to one patrilineal group. I then calculate the associated t-values. Both the estimated *t*-values and beta coefficients are displayed in Fig. 3. This exercise allows me to examine whether the data can generate a positive and significant effect of matrilineal kinship on women's willingness to compete when only comparing one group to another instead of multiple groups to each other.

[10] In round 4, where individuals are given a choice of piece rate or tournament pay over round 1 performance, almost all individuals made the same choice as they had in round 3. Thus, round 4 choices are not presented in subsequent analyses.

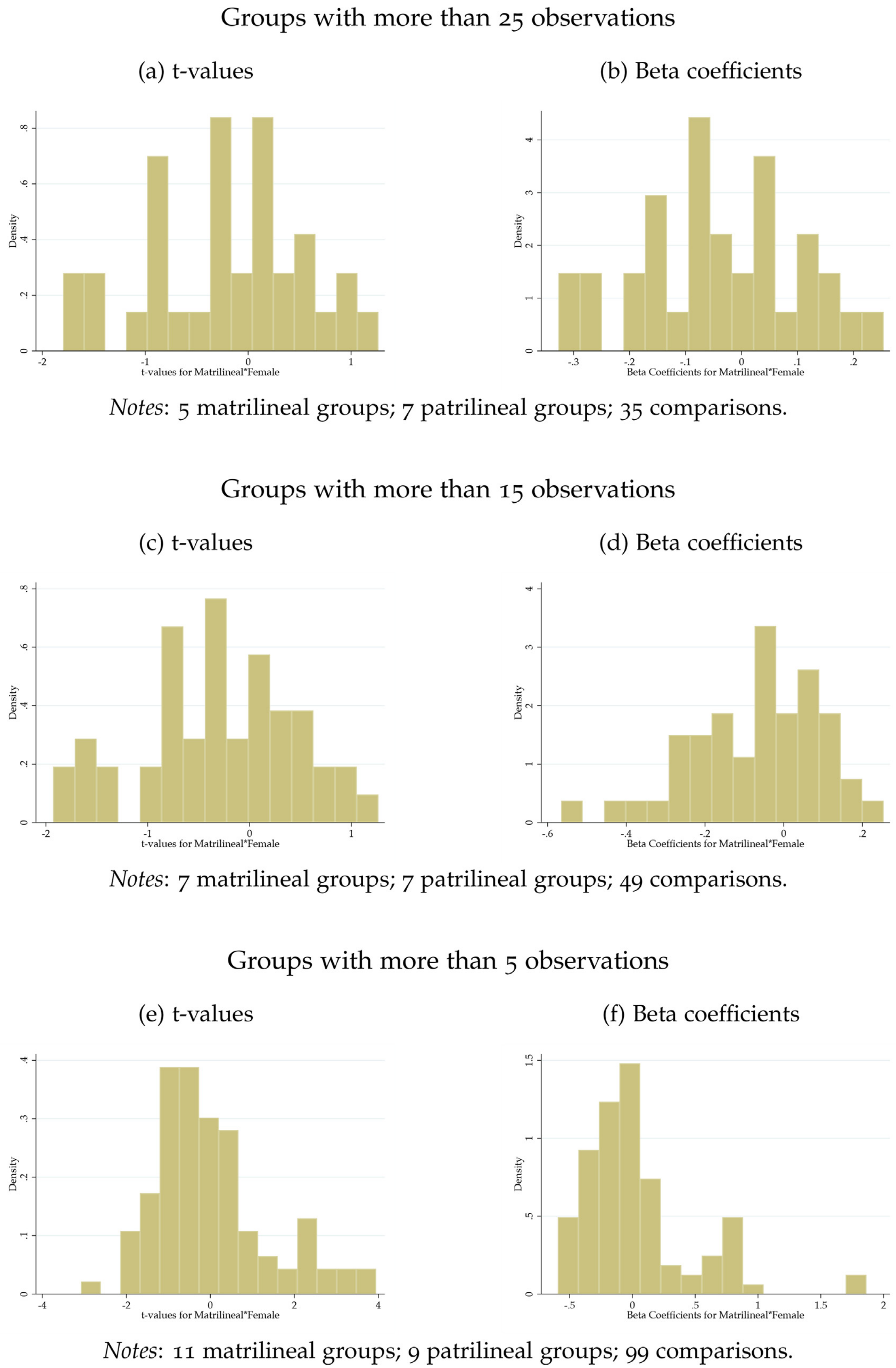

Fig. 3. Single group comparisons. Groups with more than 25, 15, and 5 observations.

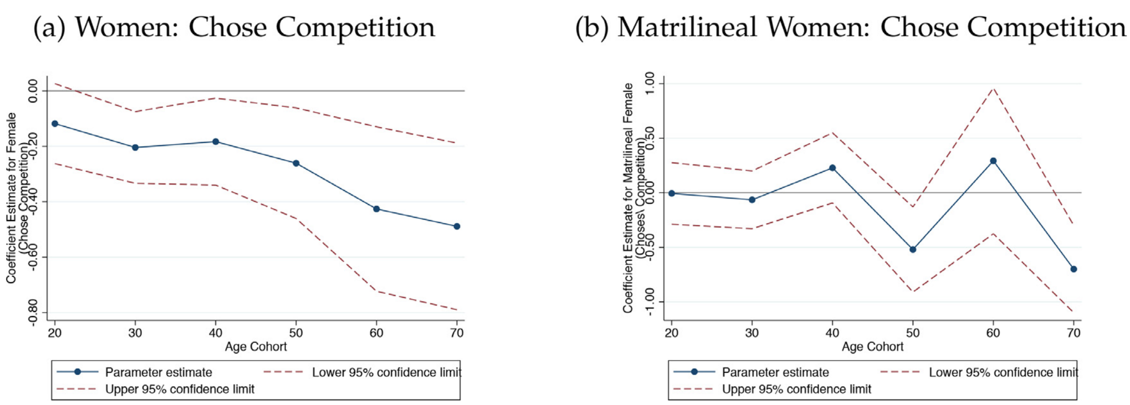

Fig. 4. Chose competition by age cohort.

In the study sample, some ethnic groups are more represented than others, so I conduct this exercise by first restricting the sample to groups for which I have many observations, then include groups for which I have fewer observations. I restrict the sample to comparisons between groups with at least 25 individuals in Fig. 3a and b. I then present the results for groups with at least 15 individuals in Fig. 3c and d, and groups with at least five individuals in Fig. 3e and f.

Fig. 3a suggests that by comparing one matrilineal group to one patrilineal group it is possible to generate a positive, but insignificant, effect of matrilineal kinship on women's willingness to compete. Most of the *t*-values are around 0. Only once I include groups with 5 or more individuals (i.e. groups for which I only have a few observations) in the analysis is it possible to generate a positive and significant effect of matrilineal kinship on women's willingness to compete. Across all of the figures, the modal t-value is close to 0, as is the modal beta coefficient.

3.5. By age cohort

I examine whether preference for competition varies by age cohort. I construct cohorts by age decade.[11] Fig. 4 plots the estimated effect of female and matrilineal female on choice of competition by cohort. Fig. 4a suggests that for all cohorts of women, women are less likely to compete than men. The effect is largest for the oldest cohorts and is less pronounced with the younger cohorts. Fig. 4b plots the effect for matrilineal female by age cohort. The estimates become noisy because the sample size is smaller for older cohorts. The estimated effect is around 0 for younger cohorts and inconsistent and sometimes negative for older cohorts. These plots suggests that there are no consistent age patterns of matrilineal kinship on women's preference for competition. However, there is some evidence that younger women prefer to compete more than older women.

3.6. By migration status

The sample is observed in Kananga, a major urban area. It is possible that the effect of matrilineal kinship changes in urban areas relative to rural areas. Specifically, matrilineal kinship may only affect women's preference for competition if women are born in or socialized in a rural setting. Thus, I examine the estimated effects of matrilineal kinship on women's preference for competition splitting the sample by: (1) individuals born in Kananga and (2) individuals raised in their rural village (rather than in Kananga). Most of the sample was born outside of Kananga (32 percent of patrilineal individuals and14 percent of matrilineal individuals were born in Kananga). I define raised in a village as those who were not born in Kananga and did not move to Kananga before the age of 20. Approximately 31% of patrilineal individuals and 62% of matrilineal individuals were raised in a village. Individuals in the sample have spent on average 24 years in Kananga.

Table 5 presents the results for those born in Kananga relative to those born elsewhere and for those raised in the village relative to those raised in Kananga. In both sub-samples, women choose to compete less than men. There is no significant effect of matrilineal kinship on women's preference for competition in either sub-sample. These results do not provide evidence in favor of a differing effect of matrilineal kinship based on time spent in the urban setting.

[11] Note, the sample only includes individuals 18 or older. Almost all of the sample has children, so I cannot examine preference for competition by motherhood status. I group 18 and 19 year olds with those under 30 and group all individuals over 70 to avoid issues with small samples for some decades.

Table 5
Chose competition by migration status.

	Panel A: OLS, Dep. Var.: Chose Competition					
	Not Born in Kananga			Born in Kananga		
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.238	−0.238	−0.229	−0.141	−0.138	−0.117
	(0.043)***	(0.043)***	(0.057)***	(0.069)**	(0.070)**	(0.078)
	(0.038)***	(0.038)***	(0.044)***	(0.045)***	(0.048)***	(0.050)**
	(0.040)***	(0.040)***	(0.051)***	(0.042)***	(0.044)***	(0.050)**
Matrilineal		−0.016	−0.007		0.026	0.074
		(0.042)	(0.052)		(0.083)	(0.092)
		(0.038)	(0.049)		(0.067)	(0.062)
		(0.037)	(0.046)		(0.075)	(0.060)
Matrilineal*Female			−0.020			−0.102
			(0.083)			(0.160)
			(0.081)			(0.110)
			(0.080)			(0.095)
Wild Bootstrap *p*-Value for:						
Cluster 1: Female	0	0	0.000100	0.0119	0.0230	0.0775
Cluster 2: Female	0	0	0.00210	0.0260	0.0348	0.144
Observations	460	460	460	154	154	154
Clusters 1	48	48	48	30	30	30
Clusters 2	28	28	28	17	17	17
Mean Dep. Var.	0.707	0.707	0.707	0.740	0.740	0.740
	Panel B: OLS, Dep. Var.: Chose Competition					
	Not Raised in Village			Raised in Village		
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.190	−0.190	−0.168	−0.214	−0.212	−0.194
	(0.048)***	(0.048)***	(0.055)***	(0.058)***	(0.058)***	(0.086)**
	(0.035)***	(0.036)***	(0.036)***	(0.053)***	(0.053)***	(0.089)**
	(0.040)***	(0.040)***	(0.044)***	(0.049)***	(0.050)***	(0.088)**
Matrilineal		0.009	0.059		−0.035	−0.023
		(0.054)	(0.067)		(0.054)	(0.062)
		(0.054)	(0.046)		(0.049)	(0.053)
		(0.057)	(0.043)		(0.050)	(0.049)
Matrilineal*Female			−0.086			−0.032
			(0.101)			(0.112)
			(0.090)			(0.110)
			(0.078)			(0.099)
Wild Bootstrap *p*-Value for:						
Cluster 1: Female	0	0	0.000300	0.000300	0.000300	0.0448
Cluster 2: Female	0.000500	0.000500	0.0176	0.000400	0.000400	0.0458
Observations	342	342	342	268	268	268
Clusters 1	42	42	42	41	41	41
Clusters 2	24	24	24	26	26	26
Mean Dep. Var.	0.705	0.705	0.705	0.731	0.731	0.731

Notes: The standard errors are: robust, clustered at the ethnic group by gender level, and clustered at the ethnic group level. *p*-Value is the wild bootstrap *p*-value for clustering at the ethnicity by gender or ethnicity level for the stated coefficient. Controls for age, age squared, and lab. *Born in Kananga* means that the individual reports Kananga as the village of birth. *Raised in Village* means that the individual was not born in Kananga and moved to Kananga after the age of 20. *Female* is an indicator variable equal to 1 if the respondent is a woman. *Matrilineal* is an indicator variable equal to 1 if the respondent is from an ethnic group that is matrilineal. *Chose Competition* is an indicator variable equal to 1 if the respondent chose tournament pay in round 3 rather than piece rate pay. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

4. Robustness and extensions

4.1. Controls for round 2 performance and beliefs about round 2 performance

It is possible that actual performance in the tournament round or beliefs on relative ranking in the tournament round differentially affect (matrilineal) women's choice to compete. Thus, in Table 6 Panel A, I control for actual round 2 performance. The first two columns look at preference for competition focusing only on differences in gender. On average, individuals who complete more games in round 2 are more likely to choose to compete. Women are still much less likely to compete relative to men, even once I control for their performance in round 2. Additionally, actual performance does not seem to differentially affect the choice of women relative to men. Columns (3) to (6) examine variation across kinship sys-

Table 6
Round 2 Performance and Beliefs about Performance.

	Panel A: OLS, Dep. Var.: Chose Competition Control for Round 2 Performance					
	By Gender		By Matrilineal		By Gender and Matrilineal	
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.208	−0.297	−0.208	−0.209	−0.189	−0.314
	(0.035)***	(0.098)***	(0.035)***	(0.035)***	(0.043)***	(0.116)***
	(0.029)***	(0.092)***	(0.030)***	(0.030)***	(0.037)***	(0.107)***
	(0.032)***	(0.083)***	(0.032)***	(0.032)***	(0.043)***	(0.100)***
Performance	0.069	0.061	0.070	0.065	0.070	0.053
	(0.008)***	(0.011)***	(0.008)***	(0.009)***	(0.008)***	(0.013)***
	(0.008)***	(0.008)***	(0.008)***	(0.010)***	(0.008)***	(0.008)***
	(0.009)***	(0.008)***	(0.009)***	(0.011)***	(0.009)***	(0.009)***
Female*Performance		0.015				0.021
		(0.014)				(0.017)
		(0.014)				(0.016)
		(0.013)				(0.016)
Matrilineal			−0.034	−0.103	−0.010	−0.128
			(0.035)	(0.107)	(0.043)	(0.151)
			(0.031)	(0.111)	(0.041)	(0.116)
			(0.032)	(0.125)	(0.040)	(0.118)
Matrilineal*Performance				0.012		0.020
				(0.016)		(0.021)
				(0.016)		(0.016)
				(0.017)		(0.016)
Matrilineal*Female					−0.049	0.032
					(0.068)	(0.211)
					(0.061)	(0.208)
					(0.057)	(0.181)
Matrilineal*Female*Performance						−0.014
						(0.030)
						(0.029)
						(0.026)
Wild Bootstrap *p*-Value for:						
Cluster 1: Female	0	0.00520	0	0	0.000100	0.0246
Cluster 2: Female	0	0.00800	0	0	0.000500	0.0578
	Panel B: OLS, Dep. Var.: Chose Competition Control for Beliefs about Round 2 Performance					
	By Gender		By Matrilineal		By Gender and Matrilineal	
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.169	−0.043	−0.169	−0.170	−0.154	−0.139
	(0.038)***	(0.108)	(0.038)***	(0.038)***	(0.046)***	(0.130)
	(0.032)***	(0.101)	(0.032)***	(0.032)***	(0.037)***	(0.117)
	(0.029)***	(0.095)	(0.029)***	(0.029)***	(0.038)***	(0.105)
Beliefs	0.043	0.055	0.043	0.039	0.043	0.041
	(0.008)***	(0.011)***	(0.008)***	(0.010)***	(0.008)***	(0.014)***
	(0.007)***	(0.011)***	(0.007)***	(0.008)***	(0.007)***	(0.012)***
	(0.007)***	(0.011)***	(0.007)***	(0.009)***	(0.007)***	(0.012)***
Female*Beliefs		−0.022				−0.003
		(0.016)				(0.020)
		(0.015)				(0.017)
		(0.015)				(0.014)
Matrilineal			−0.019	−0.076	0.001	−0.207
			(0.035)	(0.106)	(0.043)	(0.175)
			(0.031)	(0.096)	(0.038)	(0.156)
			(0.034)	(0.099)	(0.038)	(0.154)
Matrilineal*Beliefs				0.010		0.033
				(0.016)		(0.024)
				(0.013)		(0.020)
				(0.013)		(0.020)
Matrilineal*Female					−0.040	0.224
					(0.070)	(0.220)
					(0.063)	(0.201)
					(0.056)	(0.192)
Matrilineal*Female*Beliefs						−0.043
						(0.033)
						(0.028)
						(0.028)

(*continued on next page*)

Table 6 (*continued*)

	Panel A: OLS, Dep. Var.: Chose Competition Control for Round 2 Performance					
	By Gender		By Matrilineal		By Gender and Matrilineal	
	(1)	(2)	(3)	(4)	(5)	(6)
Wild Bootstrap *p*-Value for:						
Cluster 1: Female	0.000100	0.677	0.000100	0.000100	0.00130	0.258
Cluster 2: Female	0	0.673	0	0	0.00560	0.237
Observations	614	614	614	614	614	614
Clusters 1	48	48	48	48	48	48
Clusters 2	28	28	28	28	28	28
Mean Dep. Var.	0.715	0.715	0.715	0.715	0.715	0.715

Notes: The standard errors are: robust, clustered at the ethnic group by gender level, and clustered at the ethnic group level. Robust standard errors in parentheses. *p*-Value is the wild bootstrap *p*-value for clustering at the ethnicity by gender or ethnicity level for the stated coefficient. Controls for age, age squared, and lab. *Female* is an indicator variable equal to 1 if the respondent is a woman. *Performance* is the number of games the individual completed during round 2. *Matrilineal* is an indicator variable equal to 1 if the respondent is from an ethnic group that is matrilineal. *Beliefs* is the individual's belief about their relative performance in round 2. It is measured as the number of 9 other people the respondent believes they performed better than. *Chose Competition* is an indicator variable equal to 1 if the respondent chose tournament pay in round 3 rather than piece rate pay. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

tem and kinship system interacted with gender. Women are still less likely to compete than men, and this is not differential across kinship system.

Panel B controls for an individual's beliefs about their relative ranking in round 2. Respondents were asked to imagine they were in a group with 9 other randomly chosen individuals and to report how many of those individuals they believe they did better than in the task (for a maximum of 9). Again, columns (1) and (2) look at variation by gender. Women are still significantly less likely to choose competition, though the effect size is slightly smaller than in Panel A at 17 percentage points. On average, individuals who believe they did better in round 2 are more likely to choose to compete in round 3. Column (2) adds an interaction term between female and beliefs about performance. Interestingly, the coefficient on female is no longer significant. Women who believe they had better performance in the round 2 task are less likely to chose to compete relative to men with the same beliefs. However, controlling for beliefs about performance does not actually close the gender gap in preference for competition, as the estimated coefficient on female is for women who believe they performed better than no other individuals. If we were to evaluate the effect of beliefs at the average beliefs about performance (e.g. perform better than about 6 other individuals), then there is still a positive and sizable gender gap.

Columns (3) to (6) of Panel B examine variation across kinship systems and kinship system and gender, controlling for perceived relative performance. Women are consistently less likely to choose to compete, and this is not differential across kinship systems.

4.2. Overconfidence in performance

I now examine whether overconfidence in abilities explains the gap in preference for competition. I measure overconfidence as the difference between an individual's beliefs about their rank during round 1 or round 2 and their actual rank during round 1 or round 2. I calculate actual rank by constructing performance deciles. For positive values, individuals believe they did better than they actually did, and for negative values, individuals did better than they believed.

First, I examine who is likely to be overconfident in Panel A of Table 7. The mean of the dependent variable, level of overconfidence, is 1.7, suggesting that on average individuals are overconfident and tend to estimate their rank to be higher than it actually is. This effect is larger in the competition round. Interestingly, men are more overconfident than women, but this effect is only significant in the competition round.

Given that men are more overconfident in their abilities than women, overconfidence may explain the gender gap in willingness to compete. Therefore, in Panel B of Table 7 I look at willingness to compete, controlling for overconfidence in Round 2 game play and an interaction term between female and overconfident. There is no significant direct effect of overconfidence; however, for women, overconfidence actually makes them less likely to compete, as seen in column (2).

4.3. Willingness to take risks

Participants completed a series of three incentivized risk questions. Individuals had to choose between gambles, in which one of the two options is more risky. For example, one of the questions asks respondents if they would rather play Game 1, where they can win 1500 CF with 50% probability or 1000 CF with 50% probability, or Game 2, where they can win 2500 CF with 50% probability or 0 CF with 50% probability. To ensure that the respondent understood the probability of each outcome, the gambles were contextualized using a local game that has a 50% probability of winning and losing. One of the questions was chosen at random to be actually played and paid out based on the individual's choice. I construct an index

Table 7
Overconfidence in performance.

	Panel A: OLS, Dep. Var.: Overconfidence in Rounds 1 and 2					
	By Gender		By Matrilineal		By Gender and Matrilineal	
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.614	−0.362	−0.619	−0.619	−0.599	−0.359
	(0.197)***	(0.213)*	(0.197)***	(0.197)***	(0.252)**	(0.272)
	(0.236)**	(0.237)	(0.238)**	(0.238)**	(0.317)*	(0.320)
	(0.259)**	(0.261)	(0.260)**	(0.260)**	(0.390)	(0.394)
Round2	0.497	0.749	0.497	0.598	0.497	0.839
	(0.089)***	(0.118)***	(0.089)***	(0.109)***	(0.089)***	(0.152)***
	(0.087)***	(0.095)***	(0.087)***	(0.101)***	(0.087)***	(0.113)***
	(0.073)***	(0.096)***	(0.073)***	(0.074)***	(0.073)***	(0.114)***
Female*Round2		−0.505				−0.479
		(0.176)***				(0.216)**
		(0.144)***				(0.154)***
		(0.138)***				(0.156)***
Matrilineal			−0.198	−0.069	−0.172	−0.059
			(0.194)	(0.212)	(0.237)	(0.265)
			(0.210)	(0.221)	(0.281)	(0.295)
			(0.232)	(0.233)	(0.284)	(0.291)
Matrilineal*Round2				−0.258		−0.227
				(0.185)		(0.238)
				(0.176)		(0.194)
				(0.132)*		(0.182)
Matrilineal*Female					−0.052	−0.015
					(0.383)	(0.416)
					(0.413)	(0.428)
					(0.388)	(0.389)
Matrilineal*Female*Round2						−0.074
						(0.367)
						(0.296)
						(0.292)
Wild Bootstrap *p*-Value for:						
Cluster 1: Female	0.0129	0.138	0.0135	0.0135	0.0708	0.280
Cluster 1: Female*Round2		0.00110				0.0139
Cluster 2: Female	0.0218	0.197	0.0201	0.0201	0.167	0.442
Cluster 2: Female*Round2		0.00420				0.0599
Observations	1228	1228	1228	1228	1228	1228
Individuals	614	614	614	614	614	614
Clusters 1	48	48	48	48	48	48
Clusters 2	28	28	28	28	28	28
Mean Dep. Var.	1.740	1.740	1.740	1.740	1.740	1.740
	Panel B: OLS, Dep. Var.: Chose Competition Control for Overconfidence					
	By Gender		By Matrilineal		By Gender and Matrilineal	
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.230	−0.177	−0.231	−0.231	−0.213	−0.164
	(0.037)***	(0.044)***	(0.037)***	(0.037)***	(0.046)***	(0.054)***
	(0.034)***	(0.045)***	(0.034)***	(0.035)***	(0.037)***	(0.057)***
	(0.034)***	(0.052)***	(0.035)***	(0.035)***	(0.043)***	(0.069)**
Overconfidence	−0.016	−0.001	−0.016	−0.017	−0.016	−0.004
	(0.007)**	(0.009)	(0.007)**	(0.009)**	(0.007)**	(0.011)
	(0.008)*	(0.008)	(0.008)*	(0.011)	(0.008)*	(0.010)
	(0.008)**	(0.009)	(0.008)**	(0.011)	(0.008)**	(0.010)
Female*Overconfidence		−0.026				−0.023
		(0.013)**				(0.016)
		(0.015)*				(0.020)
		(0.016)				(0.020)
Matrilineal			−0.021	−0.028	0.002	−0.012
			(0.036)	(0.044)	(0.046)	(0.061)
			(0.034)	(0.046)	(0.041)	(0.065)
			(0.033)	(0.038)	(0.040)	(0.065)
Matrilineal*Overconfidence				0.004		0.007
				(0.013)		(0.016)
				(0.015)		(0.015)
				(0.013)		(0.015)

(*continued on next page*)

Table 7 (*continued*)

	Panel A: OLS, Dep. Var.: Overconfidence in Rounds 1 and 2					
	By Gender		By Matrilineal		By Gender and Matrilineal	
	(1)	(2)	(3)	(4)	(5)	(6)
Matrilineal*Female					−0.046	−0.033
					(0.072)	(0.086)
					(0.067)	(0.089)
					(0.065)	(0.099)
Matrilineal*Female*Overconfidence						−0.007
						(0.025)
						(0.027)
						(0.031)
Wild Bootstrap *p*-Value for:						
Cluster 1: Female	0	0.000700	0	0	0.000200	0.00650
Cluster 1: Female*Overconfidence		0.117				0.331
Cluster 2: Female	0	0.00190	0	0	0.000900	0.0189
Cluster 2: Female*Overconfidence		0.163				0.419
Observations	614	614	614	614	614	614
Clusters 1	48	48	48	48	48	48
Clusters 2	28	28	28	28	28	28
Mean Dep. Var.	0.715	0.715	0.715	0.715	0.715	0.715

Notes: Panel A: the standard errors are: clustered at the individual level, clustered at the ethnic group by gender level, and clustered at the ethnic group level. Panel B: the standard errors are: robust, clustered at the ethnic group by gender level, and clustered at the ethnic group level. Controls for age, age squared, and lab. *Female* is an indicator variable equal to 1 if the respondent is a woman. *Round 2* is an indicator variable equal to 1 for information pertaining to round 2. *Overconfidence* is the difference between an individuals belief about their relative performance minus their actual rank. *Matrilineal* is an indicator variable equal to 1 if the respondent is from an ethnic group that is matrilineal. *Chose Competition* is an indicator variable equal to 1 if the respondent chose tournament pay in round 3 rather than piece rate pay. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

with the responses to the choice over gambles that is increasing in an individual's preference for risky gambles to construct the preference for risk index. The index is the share of gambles for which the individual chose the gamble with more risk.

Panel A of Table 8 examines preference for risk by gender and kinship system. Columns (1) and (2) suggest that women are less likely to choose the risky gambles. This does not change after controlling for matrilineal in columns (3) and (4). However, once a matrilineal and female interaction term is added in Columns (5) and (6), the gap in risk preference is closed for matrilineal women. Matrilineal men, matrilineal women, and patrilineal men exhibit similar preference for risk taking, with patrilineal women being the least likely to choose risky gambles.

Given that matrilineal kinship closes the gender gap in preference for risky gambles, Panel B of Table 8 presents the results controlling for risk preference. Those who prefer to take risks in the incentivized gambles are also more likely to choose to compete. However, controlling for preference for risky gambles does not decrease the gender gap in willingness to compete. There are no differential effects of preference for risky gambles across kinship systems on willingness to compete

5. Physiological data

5.1. EDA data collection

Thus far the results suggest that there are no differences between matrilineal and patrilineal women in preference for competition. I replicate results consistent with other settings where women are less likely to compete, and this cannot be fully explained by performance, beliefs about performance, preference for risky gambles, or education. However, this provides little insight into why women are less likely to compete. Therefore, I collect physiological data during game play that allows me to examine (1) how individuals respond to the various rounds of game play and (2) to test if changes in physiological measures predict preference for competition. Additionally, I can use the data to see if there are different physiological responses across gender and kinship system. This approach is similar to Lowes (2018), which examines physiological responses across kinship system in a bargaining task when paired with a spouse and when paired with stranger.

A subset of respondents complete the competition task in a laboratory setting while wearing a device designed to monitor electrodermal activity (EDA). EDA is the autonomic, or involuntary, change in the electrical properties of the skin. With increased arousal, the body increases sweat activity, and the skin is better able to conduct electricity. Greater skin conductance is generally associated with increased stress (Boucsein, 1992). The benefit of examining physiological responses to game play is that these are automatic responses that individuals cannot control. Therefore, these type of data may provide insight into how an individual is responding internally to various stimuli, in addition to the choices we observe during the experiments.

Table 8
Risk index.

	OLS, Dep. Var.: Risk Preference Index					
	By Gender		By Matrilineal		By Gender and Matrilineal	
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.064	−0.065	−0.062	−0.069	−0.109	−0.113
	(0.029)**	(0.033)*	(0.029)**	(0.033)**	(0.037)***	(0.040)***
	(0.034)*	(0.042)	(0.032)*	(0.039)*	(0.033)***	(0.040)***
	(0.035)*	(0.045)	(0.035)*	(0.043)	(0.031)***	(0.039)***
Years Education		−0.000		−0.002		−0.001
		(0.004)		(0.004)		(0.004)
		(0.005)		(0.004)		(0.004)
		(0.005)		(0.005)		(0.005)
Matrilineal			0.062	0.065	0.004	0.006
			(0.028)**	(0.029)**	(0.037)	(0.038)
			(0.032)*	(0.031)**	(0.044)	(0.043)
			(0.032)*	(0.032)*	(0.045)	(0.046)
Matrilineal*Female					0.119	0.117
					(0.055)**	(0.056)**
					(0.057)**	(0.056)**
					(0.049)**	(0.049)**
Wild Bootstrap *p*-Value for:						
Cluster 1: Female	0.106	0.178	0.108	0.144	0.0268	0.0493
Cluster 1: Matrilineal			0.0853	0.0641	0.940	0.898
Cluster 1: Matrilineal*Female					0.0658	0.0652
Cluster 2: Female	0.144	0.275	0.151	0.223	0.0173	0.0468
Cluster 2: Matrilineal			0.0749	0.0749	0.944	0.944
Cluster 2: Matrilineal*Female					0.0508	0.0567
Observations	614	614	614	614	614	614
Clusters 1	48	48	48	48	48	48
Clusters 2	28	28	28	28	28	28
Mean Dep. Var.	0.571	0.571	0.571	0.571	0.571	0.571
	OLS, Dep. Var.: Chose Competition Control for Risk Preference Index					
	By Gender		By Matrilineal		By Gender and Matrilineal	
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.208	−0.179	−0.208	−0.209	−0.183	−0.163
	(0.037)***	(0.070)**	(0.037)***	(0.037)***	(0.046)***	(0.087)*
	(0.032)***	(0.059)***	(0.033)***	(0.033)***	(0.039)***	(0.064)**
	(0.034)***	(0.055)***	(0.034)***	(0.034)***	(0.044)***	(0.066)**
Risk Index	0.141	0.169	0.144	0.137	0.148	0.163
	(0.053)***	(0.073)**	(0.053)***	(0.065)**	(0.053)***	(0.090)*
	(0.052)***	(0.073)**	(0.053)***	(0.068)*	(0.054)***	(0.093)*
	(0.052)**	(0.079)**	(0.053)**	(0.060)**	(0.053)***	(0.097)
Female*Risk Index		−0.050				−0.038
		(0.103)				(0.127)
		(0.107)				(0.137)
		(0.116)				(0.160)
Matrilineal			−0.025	−0.038	0.006	−0.006
			(0.036)	(0.075)	(0.045)	(0.104)
			(0.034)	(0.071)	(0.040)	(0.089)
			(0.034)	(0.077)	(0.039)	(0.089)
Matrilineal*Risk Index				0.022		0.020
				(0.108)		(0.149)
				(0.104)		(0.136)
				(0.104)		(0.139)
Matrilineal*Female					−0.063	−0.056
					(0.072)	(0.148)
					(0.066)	(0.134)
					(0.063)	(0.120)
Matrilineal*Female*Risk Index						−0.008
						(0.213)
						(0.194)
						(0.203)
Wild Bootstrap *p*-Value for:						
Cluster 1: Female	0	0.00500	0	0	0.000200	0.0401
Cluster 1: Female	0	0.00990	0	0	0.00130	0.104
Observations	614	614	614	614	614	614
Clusters 1	48	48	48	48	48	48
Clusters 2	28	28	28	28	28	28
Mean Dep. Var.	0.715	0.715	0.715	0.715	0.715	0.715

Notes: The standard errors are: robust, clustered at the ethnic group by gender level, and clustered at the ethnic group level. Controls for age, age squared, and lab. *p*-Value is the wild bootstrap *p*-value for clustering at the ethnicity by gender or ethnicity level for the stated coefficient. Panel A, columns 2, 4, and 6, control for years of education *Female*is an indicator variable equal to 1 if the respondent is a woman. *Risk Preference Index* is an index increasing in preference for risk constructed from three incentivized gambles. *Matrilineal* is an indicator variable equal to 1 if the respondent is from an ethnic group that is matrilineal. *Years of Education* is the number of years of education the respondent has completed. *Chose Competition* is an indicator variable equal to 1 if the respondent chose tournament pay in round 3 rather than piece rate pay. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 9
Skin conductance levels and changes across rounds.

	OLS, Dep. Var.:								
	Std. SCL in Round 1			Std. SCL in Round 2			Change in Std. SCL		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Female	−0.125	−0.126	−0.100	−0.092	−0.092	−0.043	0.034	0.034	0.057
	(0.114)	(0.114)	(0.136)	(0.141)	(0.142)	(0.167)	(0.083)	(0.083)	(0.102)
	(0.125)	(0.124)	(0.136)	(0.137)	(0.137)	(0.189)	(0.057)	(0.057)	(0.084)
	(0.117)	(0.116)	(0.138)	(0.138)	(0.138)	(0.217)	(0.060)	(0.060)	(0.096)
Matrilineal		−0.044	−0.018		−0.009	0.040		0.035	0.058
		(0.110)	(0.180)		(0.135)	(0.212)		(0.067)	(0.100)
		(0.124)	(0.226)		(0.135)	(0.247)		(0.045)	(0.070)
		(0.134)	(0.229)		(0.143)	(0.250)		(0.044)	(0.070)
Matrilineal*Female			−0.053			−0.100			−0.046
			(0.220)			(0.271)			(0.135)
			(0.248)			(0.282)			(0.096)
			(0.236)			(0.284)			(0.104)
Wild Bootstrap *p*-Value for:									
Cluster 1: Female	0.352	0.358	0.557	0.530	0.540	0.853	0.566	0.558	0.523
Cluster 2: Female	0.330	0.325	0.810	0.568	0.573	0.975	0.576	0.573	0.580
Observations	170	170	170	170	170	170	170	170	170
Clusters 1	36	36	36	36	36	36	36	36	36
Clusters 2	21	21	21	21	21	21	21	21	21
Mean Dep. Var.	0.397	0.397	0.397	0.583	0.583	0.583	0.186	0.186	0.186

Notes: The standard errors are: robust, clustered at the ethnic group by gender level, and clustered at the ethnic group level. *p*-Value is the wild bootstrap *p*-value for clustering at the ethnicity by gender or ethnicity level for the stated coefficient. Controls for age and age squared. *Female* is an indicator variable equal to 1 if the respondent is a woman. *Matrilineal* is an indicator variable equal to 1 if the respondent is from an ethnic group that is matrilineal.*Standardized SCL* is the log of the skin conductance level in μS during a round of the task standardized by baseline skin conductance. *Change SCL* is the difference in the standardized skin conductance levels between the tournament round and the piece rate round. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Lab participants wear Empatica E4 Wristbands that collect real-time physiological data on electrodermal activity.[12] Times series data of skin conductance captures two types of activity. The first type of activity, *tonic* activity, varies slowly and is measured by the *skin conductance level* (SCL). The second type of activity, the fast varying *phasic* activity, is measured by the skin conductance response (SCR). A SCR occurs when the sympathetic nervous system, which is responsible for the body's "fight or flight" response, sends a signal to the fibers that control the sweat glands. EDA is measured in microSiemens, denoted μS. Given that the participation in the competition task took place over a five minute period, I examine SCL rather than SCR (Benedek, 2016; Benedek and Kaernbach, 2010; Boucsein, 1992).

5.2. EDA analysis

I first present data on SCL in round 1, where all individuals complete the task at piece rate pay, and round 2, where all individuals complete the task under tournament pay. I standardized the SCL relative to a baseline line SCL (by dividing an individual's observed SCL in round 1 or round 2 by their baseline SCL measure) to account for individual differences in propensity to sweat. This baseline SCL is taken during the instruction phase of the task, when individuals were sitting and listening to an enumerator explain the task. I take the log of the standardized SCL measures to address outliers.

Average SCL increases over time, as shown in the mean values of the dependent variable in Table 9. While not presented here, in the unstandardized measures of SCL, men have much higher SCL than women, consistent with other studies (Boucsein, 1992). Columns (7)–(9) of Table 9 examine the change in SCL between rounds 1 and round 2. There are no significant differences in changes in SCL between rounds across gender or kinship system. Note that the sample size is much smaller than in the previous analyses, with only 170 individuals rather than 614.[13]

I use the measure of change in stress between rounds 1 and 2 to see if this predicts entry into tournament pay in round 3, when individuals have a choice of payment scheme. The measure of change in SCL takes the difference between an individual's standardized SCL in the tournament round and the piece rate round and tests whether this predicts choice of competition in the third round. A larger value indicates a larger difference between SCL in the tournament round and piece rate round. This analysis asks how differences in physiological responses while completing the task under piece rate pay relative to under tournament pay predict subsequent willingness to compete.

[12] The Empatica E4 Wristbands also collect data on skin temperature, blood volume pulse, heart rate inter-beat interval, movement, time. For the analysis in the paper, I use the electrodermal activity (EDA) data generated by the. For more information on the E4 Wristband, see https://www.empatica.com/e4-wristband.

[13] Two individuals had unusable data due to an issue with the device tracking EDA.

Table 10
Change in SCL and round 3 choice.

	OLS, Dep. Var.: Chose Competition					
	By Gender		By Matrilineal		By Gender and Matrilineal	
	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.190	−0.132	−0.191	−0.192	−0.226	−0.173
	(0.068)***	(0.078)*	(0.068)***	(0.068)***	(0.085)***	(0.101)*
	(0.059)***	(0.065)*	(0.055)***	(0.055)***	(0.054)***	(0.064)***
	(0.055)***	(0.066)*	(0.054)***	(0.054)***	(0.056)***	(0.068)**
Change in SCL	0.027	0.143	0.030	0.044	0.031	0.185
	(0.077)	(0.083)*	(0.076)	(0.108)	(0.077)	(0.133)
	(0.073)	(0.072)*	(0.072)	(0.090)	(0.072)	(0.062)***
	(0.054)	(0.075)*	(0.052)	(0.051)	(0.052)	(0.058)***
Female*Change in SCL		−0.282				−0.276
		(0.154)*				(0.227)
		(0.121)**				(0.145)*
		(0.122)**				(0.130)**
Matrilineal			−0.078	−0.073	−0.113	−0.113
			(0.064)	(0.073)	(0.078)	(0.089)
			(0.049)	(0.058)	(0.062)*	(0.066)*
			(0.049)	(0.053)	(0.061)*	(0.066)*
Matrilineal*Change in SCL				−0.026		−0.052
				(0.149)		(0.165)
				(0.130)		(0.122)
				(0.091)		(0.122)
Matrilineal*Female					0.070	0.091
					(0.129)	(0.146)
					(0.097)	(0.110)
					(0.092)	(0.114)
Matrilineal*Female*Change in SCL						−0.061
						(0.308)
						(0.209)
						(0.202)
Wild Bootstrap *p*-Value for:						
Cluster 1: Female	0.00520	0.0469	0.00160	0.00190	0.00100	0.00980
Cluster 1: Change in SCL	0.720	0.0745	0.681	0.657	0.667	0.308
Cluster 1: Female*Change in SCL		0.0449				0.128
Cluster 1: Matrilineal					0.114	0.129
Cluster 2: Female	0.00320	0.0447	0.00250	0.00240	0.0105	0.0137
Cluster 2: Change in SCL	0.621	0.0883	0.560	0.398	0.546	0.251
Cluster 2: Female*Change in SCL		0.0807				0.177
Cluster 2: Matrilineal					0.110	0.123
Observations	170	170	170	170	170	170
Clusters 1	36	36	36	36	36	36
Clusters 2	21	21	21	21	21	21
Mean Dep. Var.	0.771	0.771	0.771	0.771	0.771	0.771

Notes: The standard errors are: robust, clustered at the ethnic group by gender level, and clustered at the ethnic group level. *p*-Value is the wild bootstrap *p*-value for clustering at the ethnicity by gender or ethnicity level for the stated coefficient. *Female* is an indicator variable equal to 1 if the respondent is a woman. *Change in SCL* is the difference in the standardized skin conductance levels between the piece-rate and tournament tasks. Standardized SCL is SCL in the round divided by a baseline measure of SCL. *Matrilineal* is an indicator variable equal to 1 if the respondent is from an ethnic group that is matrilineal. *Chose Competition* is an indicator variable equal to 1 if the respondent chose tournament pay in round 3 rather than piece rate pay. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 10 presents the results of choice of competition accounting for change in SCL. The effect size of female is very similar to previous estimates, at 19 percentage points. Change in SCL seems to positively predict choice of competition for men, but decreases the likelihood of women choosing to compete (see column (2)). Controlling for an interaction between change in SCL and female reduces the coefficient on female. The results suggest that women who experience a greater change in skin conductance between the piece rate and tournament rounds are less likely to choose to compete. A one standard deviation increase in SCL in the tournament round relative to the piece rate round leads to a 0.2 standard deviation decrease in the likelihood of women choosing competition. If I split the sample between those with an above and below median change in SCL, a significant gender gap in preference for competition only exists for those with an above median SCL response.[14]

[14] The coefficient for female for above median SCL response is −0.29 and significant, while the coefficient for female for below median SCL response is −0.08 and insignificant.

Individuals also responded to a series of questions about how they experience competition including whether they: enjoy competition, find competition stressful, find competition exhilarating, and avoid competition. The self-reported measures are standardized so that they are always increasing in preference for competition (e.g. higher values indicate greater enjoyment of competition, finding competition less stressful, finding competition more exhilarating, and less avoidance of competition). Appendix Table A3 presents the results for self-reported measures of enjoyment of and stress experienced during competition by gender and kinship systems. Women are always less likely to self-report enjoyment of competition (e.g. they are more likely to find it stressful, less likely to find it exhilarating, and are more likely to report avoiding competition); there is no differential effect for matrilineal women.

Appendix Tables A4 and A5 present the estimated effects of these questions on how competition makes respondents feel on choice to compete. The self-reported measures of how individuals experience competition are positively and significantly correlated with willingness to compete. While the analysis is not presented, only the question on whether an individual finds competition stressful predicts the SCL during the tournament round; individuals who report finding competition less stressful also have a lower SCL in the tournament round.

6. Conclusion

This paper presents evidence on how matrilineal relative to patrilineal kinship systems and stress affect preference for competition in the context of a developing country. The paper replicates many key findings in the literature on women's preference for competition, namely: women compete less than men and this is the case even when controlling for risk preferences, beliefs about performance, and actual performance. Interestingly, positive beliefs about performance do not increase women's probability of choosing competition to the same extent as they do for men. In this setting, both men and women are choosing to compete more than is optimal - e.g. even when they are not above median ability. On average, women and matrilineal men are more likely to make the "correct" choice of not competing when they are not above median ability.

I find no evidence that matrilineal kinship systems reduce the gender gap in preference for competition. The estimated effect size is close to zero and often negative. It is interesting to note that Gneezy et al., 2009 find that matrilineal kinship closes the gender gap in preference for competition among the Khasi. The results in this setting are likely different for several reasons. First, the matrilineal treatment is quite different in the two studies; in the Gneezy et al., 2009 study, the matrilineal group is also matriarchal and matrilocal, while in this setting the groups are matrilineal, but are not matriarchal nor do they practice matrilocality. This highlights the importance of clearly identifying the cultural trait of interest, as matrilineal kinship alone may not be sufficient for altering preference for competition. Additionally, the "treatment" and "comparison" groups are in a common institutional and geographic setting. This makes it easier to infer that the effect that is being isolated is due to variation in kinship system, rather than some other omitted variable. While I do not find that matrilineal kinship affects the gender gap in competition, it does fully close the gender gap in willingness to take risks.

Finally, I find evidence that men and women respond differently to changes in physiological responses associated with stress. The greater stress a woman feels in a competition round relative to the piece rate round, the less likely she is to choose to compete. These results suggest that women's physiological responses may be important predictors of their choice to compete.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at 10.1016/j.jebo.2021.09.029

References

Abadie, A., 2020. Statistical non-significance in empirical economics. Am. Econ. Rev. 2 (2), 193–208.
Aberle, D.F., 1961. Matrilineal descent in cross-cultural perspective. In: Schneider, D.M., Gough, K. (Eds.), Matrilineal Kinship. University of California Press.
Alesina, A., Brioschi, B., La Ferrara, E., 2021. Violence against women: a cross-cultural analysis for Africa. Economica 88, 70–104.
Alesina, A., Giuliano, P., Nunn, N., 2013. On the origin of gender roles: women and the plough. Q. J. Econ. 128 (2), 469–530.
Almås, I., Cappelen, A.W., Salvanes, K.G., Sorensen, E.O., Tungodden, B., 2016. What explains the gender gap in college track dropout? Experimental and administrative evidence. Am. Econ. Rev. 106 (5), 296–302.
Andersen, S., Ertac, S., Gneezy, U., List, J.A., Maximiano, S., 2013. Gender, competitiveness, and socialization at a young age: evidence from a matrilineal and a patriarchal society. Rev. Econ. Stat. 95 (4), 1438–1443.
Ashraf, N., Bau, N., Nunn, N., Voena, A., 2020. Bride price and female education. J. Polit. Econ. 128 (2), 591–641.
Bau, N., 2021. Can policy crowd out culture? Government pension plans and traditional kinship practices. Am. Econ. Rev. 111 (6), 1880–1917.
Benedek, M., 2016. Analysis of EDA using ledalab.
Benedek, M., Kaernbach, C., 2010. A continuous measure of phasic electrodermal activity. J. Neurosci. Methods 190, 80–91.
Bertrand, M., 2010. New perspectives on gender. In: Ashenfelter, O., Card, D. (Eds.), Handbook of Labor Ecomics, Vol. 4B. Elsevier, pp. 1545–1592.
Bertrand, M., Kamenica, E., Pan, J., 2015. Gender identity and relative income within households. Q. J. Econ. 130 (2), 571–614.
Bloch, F., Rao, V., 2002. Terror as a bargaining instrument: a case study of dowry violence in rural India. Am. Econ. Rev. 92 (4), 1029–2043.
Bobonis, G.J., Gonzalez-Brenes, M., Castro, R., 2013. Public transfers and domestic violence: the roles of private information and spousal control. Am. Econ. J. 5 (1), 179–205.
Boucsein, W., 1992. Electrodermal Activity. Plenum University Press, New York.
Brulé, R., Gaikwad, N., 2021. Culture, capital and the gender gap in political economy preferences: evidence from Meghalaya's tribes. J. Polit. 83 (3), 834–850.
Buser, T., Dreber, A., Mollerstrom, J., 2017. The impact of stress on tournament entry. Exp. Econ. 20, 506–530.
Buser, T., Niederle, M., Oosterbeek, H., 2014. Gender, competitiveness, and career choices. Q. J. Econ. 129 (3), 1409–1447.

Buser, T., Peter, N., Wolter, S.C., 2017. Gender, competitiveness, and study choices in high school: evidence from Switzerland. Am. Econ. Rev. 107 (5), 125–130.
Cassar, A., Wordofa, F., Zhang, Y., 2016. Competing for the benefit of offspring eliminates the gender gap in competitiveness. Proc. Natl. Acad. Sci. 113 (19), 5201–5205.
Cassar, A., Zhang, Y., 2021. Evolutionary insights and cross-cultural evidence into finding femina economica.
Deaner, R.O., Smith, B.A., 2013. Sex differences in sports across 50 societies. Cross-Cultural Res. 47 (3), 268–309.
Douglas, M., 1969. Is matriliny doomed in Africa? In: Douglas, M., Kaberry, P.M. (Eds.) Man in Africa. Tavistock Publications, London, pp. 123–137.
Ember, C.R., 1983. The relative decline in women's contribution to agriculture with intensification. Am. Anthropol. 85, 285–304.
Ember, C.R., Cunnar, C.M., 2015. Children's play and work: the relevance of cross-cultural ethnographic research for archaeologists. Child. Past 8 (2), 87–103.
Fernández, R., 2011. Does culture matter? In: Jess Benhabib, M.O.J., Bisin, A. (Eds.) Handbook of Social Economics, 1A. Elsevier, pp. 481–510.
Fernández, R., Fogli, A., 2010. Culture: an empirical investigation of beliefs, work and fertility. Am. Econ. J. 1 (1), 472–500.
Flory, J., Gneezy, U., Leonard, K., List, J., 2018. Gender, age, and competition: a disappearing gap? J. Econ. Behav. Organ. 150, 256–276.
Flory, J., Leonard, K. L., Tsaneva, M., Vasilaky, K., 2017. Changes in competitiveness with motherhood stages and culture: Evidence from patrilocal and matrilocal society.
Fortunato, L., 2012. The evolution of matrilineal kinship organization. Proc. R. Soc. Lond. 279 (1749), 4939–4945.
Fox, R., 1967. Kinship and Marriage: An Anthropological Perspective. Cambridge University Press, Cambridge.
Giuliano, P., 2007. Living arrangements in western europe: does cultural origin matter. J. Eur. Econ. Assoc. 5 (5), 927–952.
Giuliano, P., 2017. Gender: an historical perspective. In: Averett, S.L., Argys, L.M., Hoffman, S.D. (Eds.), The Oxford Handbook of Women and the Economy. Oxford University Press.
Gluckman, M., 1963. Custom and Conflict in Africa. Basil Blackwell.
Gneezy, U., Leonard, K.L., List, J.A., 2009. Gender differences in competition: evidence from a matrilineal and a patriarchal society. Econometrica 77 (5), 1637–1664.
Gneezy, U., Niederle, M., Rustichini, A., 2003. Performance in competitive environments: gender differences. Q. J. Econ. 118 (3), 1049–1074.
Gong, B., Yan, H., Yang, C.-L., 2015. Gender differences in the dictator experiment: evidence from the matrilineal Mosuo and the patriarcha Yi. Exp. Econ. 18, 302–313.
Gong, B., Yang, C.-L., 2012. Gender differences in risk attitudes: field experiments on the matrilineal Mosuo and the patriarchal Yi. J. Econ. Behav. Organ. 83 (1), 59–65.
Gottlieb, J., Robinson, A.L., 2021. How to close the gender gap in political participation: lessons from matrilineal societies in Africa. Br. J. Polit. Sci. 51 (1), 68–92.
Henrich, J., Heine, S.J., Norenzayan, A., 2010. The Weirdest People in the World?. Behaioral and Brain Sciences.
Hoffman, M., Gneezy, U., List, J., 2011. Nurture affects gender differences in spatial abilities. Proc. Natl. Acad. Sci. 108 (36), 14786–14788.
Holden, C.J., Mace, R., 2003. Spread of cattle led to the loss of matrilineal descent in Africa: a coevolutionary analysis. Proc. R. Soc. Lond. 270 (1532), 2425–2433.
Jayachandran, S., 2015. The roots of gender inequality in developing countries. Annu. Rev. Econ. 7, 63–88.
Jayachandran, S., Pande, R., 2017. Why are Indian children so short? The role of birth order and son preference. Am. Econ. Rev. 107 (9), 2600–2629.
La Ferrara, E., 2006. Descent rules and strategic transfers. Evidence from matrilineal groups in Ghana. J. Dev. Econ. 63, 280–301.
La Ferrara, E., Milazzo, A., 2017. Customary norms, inheritance, and human capital: evidence from a reform of the matrilineal system in Ghana. Am. Econ. J. 9 (4), 166–185.
Lowes, S., 2018. Matrilineal kinship and spousal cooperation: evidence from the matrilineal belt. Working Paper.
Murdock, G.P., 1959. Africa: Its Peoples and Their Cultural History. McGraw-Hill Book Company, New York.
Murdock, G.P., 1967. Ethnographic Atlas. University of Pittsburgh Press, Pittsburgh.
Niederle, M., 2016. Gender. In: Kagel, J., Roth, A.E. (Eds.), Handbook of Experimental Economics. Princeton University Press, pp. 481–553.
Niederle, M., 2017. A gender agenda: a progress report on competitiveness. Am. Econ. Rev. Pap. Proc. 107 (5), 115–119.
Niederle, M., Vesterlund, L., 2007. Do women shy away from competition? Do men compete too much? Q. J. Econ. 122 (3), 1067–1101.
Radcliffe-Brown, A., 1950. Introduction. In: Radcliffe-Brown, A., Forde, D. (Eds.), African Systems of Kinship and Marriage. Oxford University Press.
Reuben, E., Sapienza, P., Zingales, L., 2021. Taste for competition and the gender gap among young business professionals. Working Paper.
Richards, A., 1950. Some types of family structure amongst the central bantu. In: Radcliffe-Brown, A., Forde, D. (Eds.), African Systems of Kinship and Marriage. Oxford University Press.
Schlegel, A., 1972. Male Dominance and Female Autonomy: Domestic Authority in Matrilineal Societies. Human Relations Area Files Press, New Haven, CT.
Schlegel, A., Barry, H., 1989. Adolescents at play: a cross-cultural study of adolescent games. Content of Cult. 33–48.
, 1961. In: Schneider, D.M., Gough, K. (Eds.), Matrilineal Kinship. University of California Press.
Vansina, J., 1966. Introduction a l'Ethnographie du Congo. Centre de Recherche et d'Information Socio-Politiques.
Whyte, M.K., 1978. The Status of Women in Preindustrial Societies. Princeton University Press, Princeton, New Jersey.
Zhang, J., 2019. Culture, institutions, and the gender gap in competitive inclination: evidence from the communist experiment in China. Econ. J. 129 (617), 509–552.