Exploring gendered behavior in the field with experiments: Why public goods are provided by women in a Nairobi slum

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ABSTRACT

Women, and particularly women in all-female groups, appear to be especially adept at providing public goods in developing countries. We use a one-shot Public Goods game to explore the effect of sex and a group's sex composition on the voluntary provision of public goods in a Nairobi slum. Sex heterogeneity hurts the voluntary provision of public goods because women—but not men—contribute less in mixed-sex than same-sex groups. Women contribute as much as men in same-sex groups. This result is driven by women's pessimism and men's optimism about others' contributions in mixed-sex groups rather than by gendered social preferences.

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1. Introduction

When governments fail to provide public goods, voluntary provision can serve as a substitute. For example, communities in Pakistan maintain irrigation systems and roads (Khwaja, 2007). Community fundraising pays for school supplies and the maintenance of wells in Kenya (Miguel and Gugerty, 2005). In Nairobi slums, characterized by extreme poverty and government neglect, public goods are often produced through "harambee," the Swahili word for "let's pull together". This traditional Kenyan institution of community fundraising for public goods helps construct schools, clinics, and water spouts and enables people to join hands to serve as an ambulance for the ill (Mwiria, 1990).

Women appear to be particularly adept at such collective action, often to the point of purposeful exclusion of men. In Kenya, they play a more important role in harambee activities than men (Kilavuka, 2003). In our sample of Nairobi slum dwellers, women are members of significantly more community organizations than men. Women have also become the primary target of microfinance groups and ROSCAs[2] because not only are they poor, but they are also said to have higher (re)payment rates than men (e.g., Burman and Ardener, 1995; Morduch, 1999; Anderson and Baland, 2002). Depending on the geographical region, between 58 and 86 percent of all microfinance institution clients are women, and in Africa an estimated

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61 percent of clients are women (Lafourcade et al., 2005). In Nairobi slums Anderson and Baland find that 84 percent of ROSCA members are women. In our sample 68 percent of ROSCA members are women.[3]

We investigate why so many groups focus on women by exploring the role sex plays in the voluntary provision of public goods in a Nairobi slum. The slum provides an interesting environment to study the connection between what people do in their lives and how they behave in games. Due to government neglect, typically "harambee" is the only way to provide the public goods necessary to meet basic community needs. We employ experiments that are structurally identical to the "harambee" or public goods decisions that people are typically confronted with and examine whether women are more likely to provide public goods than men and why this might be. Experiments are a useful tool to study what motivates people to do the things we observe them doing. A controlled environment with random assignment to treatment conditions allows us to tease apart which variables contribute to sex-related patterns of contributions to public goods.

Sex differences in contribution rates may be due to differences in preferences or beliefs. First, women may be more other-regarding than men. We refer to this as the *unconditional social preference hypothesis*. Such unconditional social preferences could be conceptualized as warm-glow altruism (Andreoni, 1990), where women derive intrinsic benefits from cooperation independent of what others in their group do or are expected to do. For example, women have been found to be more other-regarding than men in the non-strategic dictator game (Eckel and Grossman, 1998). Women may generally enjoy cooperating more than men, or they may particularly enjoy providing public goods together with and for other women. The latter would imply that women have a "taste for discrimination" (Becker, 1957).

Alternatively, women may be more optimistic about others' contributions and base their decisions on these expectations. We refer to this as the *conditional cooperation hypothesis*. Such behavior could be conceptualized as reciprocity (Rabin, 1993), where people derive an intrinsic benefit from cooperation if other group members cooperate as well. A number of experimental and empirical papers suggest that conditional cooperation is an important motivator of behavior in public goods games (e.g., Fischbacher et al., 2001; Frey and Meier, 2004). Women may be generally more optimistic than men, or they may be particularly optimistic when confronted with other women. In this case, women would "statistically discriminate" against men (e.g., Phelps, 1972) and contribute less in mixed-sex than in same-sex groups.[4]

We use a one-shot Public Goods game to measure voluntary cooperation that is not driven by repeated game incentives or reputational concerns. In the Public Goods game n players are endowed with a certain amount of money, E. Each group member i can contribute any amount $C_i \leq E$ to the group account. The sum of these contributions is multiplied by $k > 1$ by the experimenter to capture the efficiency increasing potential of cooperation. The value of this group account $k * \sum C_i$ is then distributed equally among the group members. The final payoff P_i for each member is thus $E - C_i + (k/n)^* \sum C_i$. The amount C_i contributed exhibits cooperativeness. The Nash prediction for this game is that $C_i = 0$ since one's payoff is declining in C_i (i.e., $\partial P_i / \partial C_i < 0$).

Previous studies have found no consistent sex differences in contributions in the Public Goods game (for reviews, see, e.g., Ledyard, 1995; Eckel and Grossman, 2008; Croson and Gneezy, forthcoming). Results seem to differ substantially by context.[5] In Kenya where women are more likely than men to be the providers of public goods and are more likely to cooperate with women than with men in daily life, they may also contribute more to the public good in the laboratory, particularly when confronted with the group they usually interact with, other women.

We find that female Nairobi slum dwellers contribute more to the public good in same-sex than in mixed-sex groups. However, they do not contribute more than men. Rather, they contribute as much as men in same-sex groups but less than men in mixed-sex groups. This is mainly due to women having more pessimistic expectations about the contributions of others in mixed-sex than in same-sex groups. Men do not distinguish between same-sex and mixed-sex groups, either in their expectations of others' contributions or in their behavior. They are equally likely to contribute to the public good in both settings. We offer some conjectures for why this might be the case.

Our paper is organized as follows. Section 2 describes the experimental context and design. Section 3 provides a conceptual framework and more formally articulates our hypotheses. Section 4 presents the results. Section 5 discusses our results in the context of our sample population and related literature, and Section 6 concludes.

2. Experimental context and design

The experiments were conducted in the Kwa Reuben area of Embakasi Slum in Nairobi, Kenya. The slums in Nairobi lack basic public services.[6] In our sample, 67 percent report not having electricity in their households.[7] Incomes are very low,

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[3] In both Anderson and Baland (2002) and our sample, approximately 40 percent of all women are participating in ROSCAs.

[4] More precisely, women may statistically discriminate against *people* in mixed-sex groups, expecting men and women in these groups to contribute less than in same-sex groups.

[5] For example, Carpenter et al. (2004) found that women contributed more than men in a slum in Vietnam but less in a slum in Thailand. Barr (2004) observed that Zimbabwean women were more cooperative than men. Evidence on the effect of sex composition on the voluntary provision of public goods is equally inconclusive. Some studies found people to be more cooperative in same-sex than mixed-sex groups (e.g., Nowell and Tinkler, 1994; Oberholzer-Gee et al., forthcoming); others obtained the opposite results or found no evidence of sex or sex composition differences (e.g., Sell et al., 1993; Sell, 1997; Carpenter et al., 2004).

[6] Under 20 percent of the slum households in this sample have access to electricity, 22 percent have running water, and less than 10 percent have flush toilets (APHRC, 2000).

[7] All demographic and economic statistics provided on our sample are based on a pre-experimental survey conducted with each participant prior to attending the experimental session (described below).

especially among women; in this sample women and men earn $35 and $55 (Ksh 2721 and Ksh 4325) per month, respectively, and 16 percent of men and 33 percent of women report no income whatsoever in the previous month.

The Kenyan tradition of "harambee" serves a vital role in meeting basic community needs in the slums and also provides a salient institutional precedent for the Public Goods game. In our sample 64 percent of the respondents report being a member of some sort of local group, 30 percent report that they are volunteers in the community, and 70 percent report having contributed to the most recent neighborhood fundraising campaign. The average contribution was $1.56 (Ksh 122) for the whole sample (including those who did not contribute), which is more than half a day's wage.

The experiments were run as follows. 270 participants from the Kwa Reuben slum were randomly recruited and invited to participate in the experiment.[8] Upon recruiting a participant, a household questionnaire was administered with the participant in his or her home to collect demographic and economic information. Then the participants were scheduled to attend an experimental session (dubbed a "workshop") in the local community center to take place a couple of days later. We conducted 10 experimental sessions, two all-female sessions, two all-male sessions, and six mixed-sex sessions, each of which lasted approximately 2 h. In each session, in addition to the Public Goods game, we also played the Investment game.[9] In order to prevent learning across games, we did not reveal earnings from either game until both games were completed. In addition, we varied the order in which the games were played by session and control for any order effects in our analysis.

Participants were seated according to their sex in two rows facing each other and randomly placed in a group of four, two from one's own row and two from the opposite row.[10] Session size ranged from 12 to 36 participants. When the number of participants in the session was not a multiple of four, which occurred in two sessions, two members in the session were randomly chosen to double as members for a second group.

In the Public Goods game participants were endowed with $E =$ Ksh 50 ($0.64) which they received in ten Ksh 5 coins worth approximately one-quarter to one-third of a day's income. In the Public Goods game each participant's contribution C_i was doubled by the experimenter ($k = 2$) and then divided evenly among the four group members. Thus, the final payoff to each group member was Ksh $50 - C_i + 0.5^* \sum C_i$.

At the beginning of the Public Goods game, participants received two envelopes, one containing the endowment of ten Ksh 5 coins and their code number slip, and a second containing just their code number slip. Here we will refer to the first as the "endowment envelope" and the second as the "contribution envelope". The experimental instructions were given in Swahili.[11] Participants' understanding was tested using examples of individual contributions and eliciting responses from the participants regarding individual final payoffs. Once they had understood the rules of the game, each participant entered a private office one at a time to make his or her decision by transferring the amount $C_i \leq 50$ from the endowment envelope to the contribution envelope and giving the contribution envelope to the experimenter. Participants were asked to "hide" their remaining money after making their contribution so as to prevent other participants from discerning how much money they had contributed. The experimenter enforced this after each participant had made his/her decision. As a necessary precaution to prevent theft, the experiments were run single-blind.[12]

After all participants had made their decisions in both the Public Goods and the Investment game, but before learning about the results, participants completed a post-experimental questionnaire where they indicated how much they expected other group members to contribute on average, $E_i(\hat{C}_{-i})$. We also asked participants how many people in the session they knew by name, which we use as a proxy for perceived social distance to group members.

At the conclusion of the session, we distributed experimental earnings to each participant privately. On average, participants earned Ksh 66 (132 percent of the endowment or $0.83) in the Public Goods game. Total average earnings from the session, including both the Public Goods and Investment game, were Ksh 123 ($1.57). Of the 270 participants 136 were men and 134 women. The participants' age ranged from 18 to 56 with a mean of 26 years. Approximately one-third of the sample population was Kikuyu and one-third Kamba. The other third of the sample was predominantly composed of Luhya Luo and Kisii, with the remaining participants coming from seventeen different tribes.

3. Conceptual framework

Voluntary cooperation is defined as the amount contributed C_i. Based on the evidence from outside of the laboratory, we expect sex or sex composition differences in contributions in our public goods experiments. While we first test for such differences, we focus on the question of why such differences exist and examine two possible hypotheses: unconditional social preferences and conditional cooperation.

First, if women were more unconditionally cooperative than men, they should contribute more to the public good than men even when controlling for expectations. They should contribute more in same-sex than in mixed-sex groups if they prefer contributing when confronted with other women only (i.e., have a taste for discriminating against men). Second, if

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[8] We recruited one adult in one household per every fifth structure in all of the neighborhoods within the Kwa Reuben slum of Nairobi. Recruitment occurred at different times of the day and different days of the week to mitigate sample bias.

[9] The results of the Investment game are discussed in Greig and Bohnet (2008).

[10] In a mixed-sex session, for example, women would find themselves seated in a row facing a row of men, and each group of four was comprised of two women and two men.

[11] The instructions are available from the authors upon request.

[12] In other words, each participant's identity and contribution were unknown to other participants but known to the experimenter.

people cooperate conditionally, then contributions should be driven by expectations. Women should contribute more than men because they are generally more optimistic than men or contribute more in same-sex than in mixed-sex groups because they expect others to contribute more in the former than in the latter. In this case, women statistically discriminate against others in mixed-sex groups because of their (accurate or inaccurate) beliefs.

To examine these two hypotheses, we estimate the following reduced form equation, where i indexes the individual and $-i$ the other three members in one's group:

$$C_i = \alpha_0 + \beta_1^* Female_i + \beta_2^* Mixed_i + \beta_3^* FemaleMixed_i + \gamma^* E_i(\hat{C}_{-i}) + \delta^* Controls_i.$$

All variables are defined in Table A.1 in Appendix A.

Hypothesis 1. *Unconditional social preferences*: Controlling for expectations, (a) women contribute more than men ($\beta_1 > 0$) and/or (b) women contribute more in same-sex than in mixed-sex groups ($\beta_3 < 0$).

Hypothesis 2. *Conditional cooperation*: Women contribute conditional on their expectations of others' contributions, controlling for the composition of the group ($\beta_1 = 0$, $\beta_2 = 0$, $\beta_3 = 0$, $\gamma > 0$). Women contribute more than men because (a) they are more optimistic than men and/or women contribute less in mixed-sex than in same-sex groups because (b) they expect others to contribute less in mixed-sex than in same-sex groups.

Expectations may or may not be rational. We test whether people's expectations accurately reflect the mean actual behavior of the other three group members (i.e., whether $E_i(\hat{C}_{-i}) = \hat{C}_{-i}$). We have no priors on how accurate people's expectations are.

We introduce two sets of control variables into our regressions: session characteristics (ethnic heterogeneity and experimental order) and individual characteristics (ROSCA membership, log of previous month's income, and perceived social distance to session members).[13] We control for the ethnic heterogeneity of the session since ethnic fractionalization has been found to be associated with lower levels of trust, public goods provision, and collective action (e.g., DiPasquale and Glaeser, 1998; Alesina et al., 1999; Alesina and La Ferrara, 2002).

Ethnic heterogeneity is measured using the ethnolinguistic fractionalization index (Ethnic) introduced by Alesina et al., which measures the probability that two randomly chosen individuals are of different ethnicities: $Ethnic = 1 - \sum_i race\%_i^2$, where $race\%_i$ represents the proportion of people in the session belonging to the Kikuyu, Kamba, Kisii, Luhya, Luo, or another ethnicity. Ethnic = 0 represents complete homogeneity, and Ethnic = 1 complete heterogeneity. The ethnic fractionalization of each session was not a treatment variable; we relied on spurious variation in the ethnic composition from session to session. However, since sample selection was random, ethnic fractionalization can be treated as exogenous. The probability that another randomly chosen person in the session would be of a different ethnic group ranged from 0.65 to 0.80 from session to session. If ethnic fractionalization reduces voluntary provision of public goods, the coefficient on Ethnic should be negative.

We include a dummy variable for ROSCA membership in order to investigate whether contributions in the Public Goods game are related to behavior outside of the laboratory. ROSCA members could be more cooperative because they have a salient example of a cooperative institution, are more optimistic about others' contributions or because trustworthiness is a selection criterion for ROSCA membership. Few studies have examined the relationship between experimental decisions and behavior outside of the laboratory thus far (see, e.g., Karlan, 2005 and Carpenter and Seki, 2005 for examples related to our study as well as a review of the literature).

Because previous evidence suggests that people are more other-regarding towards people they know better (e.g., Bohnet and Frey, 1999), we control for social distance, measured as the proportion of people in the session the participant recognizes by name (Names).[14]

We control for log of previous month's income, since there is a social norm associated with harambee such that more affluent members of society are expected to contribute more (Ensminger, 2004). As a robustness check, we also control for the order in which the games were played.

4. Results

Summary statistics of experimental behavior and session and individual characteristics are provided in Table A.2 in Appendix A. The modal contribution was Ksh 10, contributed by 27 percent of the sample. The average amount contributed was Ksh 14.59 ($0.19) or 29 percent of the endowment, which is significantly greater than zero ($p < .01$).[15] Thus the Nash prediction that contributions are zero is rejected.

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[13] In additional specifications we also tested other controls such as education and origin, but they did not affect our results.

[14] A referee suggested that we may be the first to introduce this measure of social distance.

[15] There is no significant difference in contribution rates between those who played the Public Goods game first (14.97 Ksh) and those who played the Investment game first (13.88 Ksh, $p = 0.35$). For the latter group, contribution rates do not differ according to the role participants played in the Investment game (14.56 Ksh for first movers and 14.63 Ksh for second movers, $p = 0.62$). Unless otherwise specified all tests are conducted using the Mann–Whitney test.
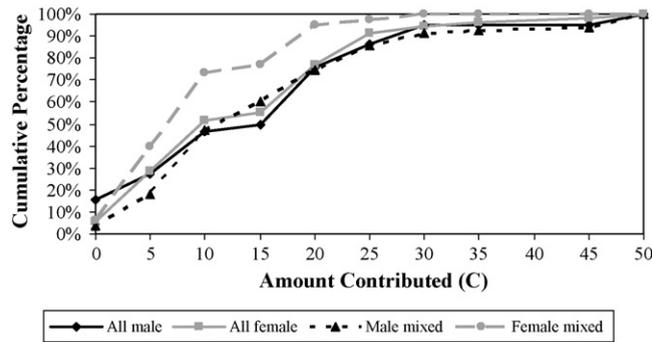
Fig. 1. Cumulative distribution of amount contributed by a group's sex composition.

Table 1
Predicting contributions.

Dependent variable	C_i [OLS] (1)	C_i [OLS] (2)	C_i [OLS] (3)
Female	−0.59 (0.85)	−0.68** (0.25)	−1.98 (1.23)
Mixed	1.10 (2.23)	1.21 (1.76)	1.42 (1.62)
Female* Mixed	−5.88** (2.45)	−2.15 (1.39)	−1.06 (1.93)
Expectations $E_i(\hat{C}_{-i})$		0.56*** (0.06)	0.57*** (0.06)
ROSCA			1.74* (0.79)
Ethnic			−26.97* (12.75)
Names			−16.79 (10.91)
Log income			−0.09 (0.11)
Order			0.17 (1.27)
Constant	15.95*** (0.14)	5.08*** (1.11)	25.96** (9.83)
Observations	270	266	266
R-Squared	0.06	0.46	0.48

* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

That said, these are among the lowest contribution rates found in the world.[16] Typically people contribute between 40 and 60 percent of their endowment (Ledyard). Such low contribution rates are consistent with our findings that this sample also exhibited one of the lowest levels of trust in the Investment game found thus far (Greig and Bohnet) and reported lower levels of trust using the GSS trust survey measure than other populations. Together this suggests that social capital is low in the Kwa Reuben slum of Nairobi.

4.1. Result 1: women contribute as much as men in same-sex and less than men in mixed-sex groups

Fig. 1 shows cumulative distribution functions by a group's sex composition, and Table A.2 (Appendix A) shows contribution rates and expectations by sex and sex-pairing. In aggregate, women contribute significantly less than men, namely 25 percent and 33 percent, respectively ($p < .01$). This difference is driven by the sex difference in contributions in mixed-sex groups, in which women contribute 21 percent and men 34 percent. There is no significant difference between women's and men's contributions in same-sex groups, which are 31 percent and 32 percent, respectively. In aggregate, contributions in mixed-sex sessions (28 percent) are marginally lower than in same-sex sessions (31 percent), though not significantly so.

Table 1 presents OLS regression results.[17] The sex difference is demonstrated in Column 1; not controlling for expectations, women contribute significantly less than men, but this difference is driven by women's lower contributions in mixed-sex sessions.

4.2. Result 2: sex differences in contributions are largely driven by expectations

Expectations are strongly positively associated with contributions: of those who contributed positive amounts 87 percent expected others to contribute as well. A 1 shilling increase in expected contributions is associated with a 0.61 shilling increase

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[16] Similarly low contribution rates have been found among the Machiguenga in Peru (23 percent) and the Mapuche in Chile (33 percent) (Henrich and Smith, 2004). In Africa, Ensminger observed that men in the Orma tribe contributed 58 percent of their endowment and villagers in Zimbabwe contributed 48 percent (Barr, 2001).

[17] We choose an OLS model rather than a Tobit model for two reasons. First it allows us to adjust our standard errors for clustering at the session level. Second we are aware that Tobit estimates are inconsistent when the error terms are heteroskedastic, and we are concerned that the errors in amount sent may not be normally distributed. Our results do not change significantly when using a Tobit instead.

in one's own contribution. Controlling for nothing else in our regression, expectations alone account for 45 percent of the variation in contributions (results not shown).

Women's lower generosity in mixed-sex groups is largely driven by expectations. As reflected in Table A.2 (Appendix A), women expect lower contributions (31 percent) than men (38 percent) ($p < 0.05$). This difference is driven by sex composition: women expected contributions of 39 percent in all-female groups and only 26 percent in mixed-sex groups ($p < 0.01$). Commensurate with their behavior, we find no significant difference in men's expectations in all-male (39 percent) versus mixed-sex (37 percent) groups. Controlling for expectations, women's contributions are no longer significantly different between all-female and mixed-sex groups (Column 2 in Table 1).

This result is robust to the inclusion of individual and session level controls (Column 3, Table 1).[18] ROSCA membership is positively associated with contributions; ROSCA members contribute Ksh 1.74 more than non-members. We also find that ethnic fractionalization has a substantial negative effect on contributions even when we hold expectations constant. The coefficient on Ethnic indicates that contributions would be Ksh 27 lower in a completely heterogeneous session than in a completely homogenous session (out of an initial endowment of Ksh 50). The fact that this result was obtained in sessions that ranged in ethnic heterogeneity from only 0.65 to 0.80 indicates that cooperation is highly sensitive to ethnic diversity.

4.3. Result 3: inaccurate expectations in mixed-sex sessions. Women underestimate and men overestimate the contributions of others in mixed-sex groups

Given that people tend to cooperate conditional on their expectations of others, we investigate whether these expectations are rational. In order to assess how rational expectations are in each session type, we compare expectations to average actual behavior for the other three group members (see Table A.2, Appendix A) using the Wilcoxon signed rank test. We find that men and women's expectations in same-sex sessions are generally accurate; they overestimate slightly but not significantly the contributions of others.

In contrast, expectations in mixed-sex groups are generally inaccurate. Men significantly overestimate others' contributions ($p < .01$); expected contributions average 37 percent, whereas other group members actually contribute only 26 percent. Women slightly underestimate the other group members' contributions ($p < .10$), expecting 26 percent while others actually contribute 30 percent. Disaggregating the other three members in one's group by sex, we find that women's expectations in mixed-sex groups (26 percent) are significantly lower than the men's average actual contributions (35 percent) ($p < .01$) and marginally significantly higher than the actual contribution of the other woman (21 percent) ($p < .10$). Men's expectations (37 percent) are significantly higher than women's average actual contributions (22 percent) ($p < .01$) but not significantly different from the other man's actual contribution (33 percent). It appears that inaccuracy of expectations in mixed-sex sessions is largely driven by discrepancies between expectations and the actual behavior of members of the opposite sex.

In sum, women contribute less in mixed-sex groups than in all-female groups because they expect people in mixed-sex groups to contribute less, supporting Hypothesis 2b. Women are not more cooperative than men (rejecting Hypotheses 1a and 2a). In most of our specifications, women are not more unconditionally cooperative in same-sex than in mixed-sex-groups (mostly rejecting Hypothesis 1b). Men do not distinguish between same-sex and mixed-sex groups, either in their expectations or in their behavior. Expectations are largely inaccurate vis-à-vis the opposite sex's actual behavior.

5. Discussion

Among Nairobi slum dwellers, women use the sex composition of a group as a proxy for expected cooperativeness of other group members. All sex effects are almost completely mediated by expectations, with expectations accounting for the largest fraction of the variance in contributions.[19] Men are not affected by the sex composition of a group. More generally, women have been found to be more sensitive to context in a variety of experiments (Croson and Gneezy). Nowell and Tinkler also report that women's but not men's contributions are sensitive to the inclusion of members of the opposite sex in a public goods game. These findings are consistent with social identity theory: lower status social groups (women) are more sensitive to social categories and changes in the situation because their fates are determined by their ability to adapt to situations controlled by the more powerful social group (men) (e.g., Lorenzi-Cioldi, 1991; Sell, 1997).

Our results help to explain why women are predominantly involved in all-female-community groups and ROSCAs. Although we cannot know whether women's low expectations in mixed-sex groups mostly reflect expectations of how men, the other woman, or individuals in mixed-sex groups in general behave, our results are broadly consistent with evidence that Kenyan women simply trust men less (Burman and Ardener, 1995; Anderson and Baland, 2002). This dynamic is captured in the telling quote of a Kenyan woman discussing the possibility of merging her ROSCA with a men's group:

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[18] Since sex composition does not significantly influence contributions in our complete model (Column 3, Table 1), we also explored whether we can instrument expectations with sex composition as a way of identifying a causal relationship between expectations and contributions. A group's sex composition serves as only a weak instrument, with an F-statistic of 3.46. Nonetheless, our conditional cooperation result is robust to this specification. Controlling for ROSCA, Ethnic, Names, age and income, expectations (instrumented by female, mixed, and female mixed) are positively associated with contributions, with each additional Ksh 1 expected resulting in a Ksh 0.91 increase in contributions.

[19] The importance of expectations for behavior in the Public Goods game is not new. Other studies with similar results, using a variety of techniques to measure expectations, include, for example, Weimann (1994), Fischbacher et al. (2001), Anthony and Horne (2003), and Gächter et al. (2004).

"Men will 'eat all the money' and leave us bankrupt. . . men do not have the true spirit of *harambee*" (Burman and Ardener). Indeed men who are admitted into women's groups usually come with the sponsorship, or are the spouses, of women in the group (Johnson, 2004). Moreover mixed-sex ROSCAS are more likely than all-female ROSCAS to allocate monthly funds in a random order to prevent early recipients from defaulting in subsequent rounds (Anderson and Baland).

These patterns have been observed elsewhere. Anthony and Horne found in the U.S. that default rates were lower in micro-credit groups with a higher proportion of women and claim that this differential behavior was due to gendered expectations of others' behavior: in groups with a higher proportion of men, people expected others to be more likely to default and as a result defaulted as well.

In dealing with members of the opposite sex, people are motivated by largely inaccurate beliefs. In our sample, women perceive men in mixed-sex groups to be less cooperative than they actually are, and men perceive women in mixed-sex groups to be more cooperative than they actually are. Men's optimism and women's pessimism in mixed-sex groups relative to actual behavior remains to be explained. Women may have stereotypical expectations of men, based on either their experiences outside of the laboratory or a more globally shared stereotype of selfish men (e.g., King et al., 1991).

In our analysis, we control for important attributes of the context. ROSCA membership and session level ethnic fractionalization are our most important control variables. Controlling for sex composition and expectations, ROSCA members contribute more in the Public Goods game than non-members. This may be because more cooperative people are more likely to be accepted into ROSCAs: an important selection criterion for the admittance of new members into ROSCAs in Kenya is their trustworthiness, and new members are often placed at the end of the cycle to prove they will not default (Gugerty, 2007). Alternatively, ROSCA membership may have made people more cooperative.

We find that among Nairobi slum dwellers, ethnic fractionalization poses a significant challenge to the voluntary provision of public goods, independent of its influence on expectations. The importance of ethnic characteristics of the session for behavior is striking but, ex post-facto, not surprising. Ethnicity has been an important axis of division in Kenya, providing a salient basis for segregation between groups. In Kenya, political and economic rents often accrue to the ethnic group of the president, and political parties, alliances and business partnerships typically emerge along ethnic lines (Biggs et al., 2002; van Ufford and Zaal, 2004). Other studies in Kenya observe that organizations tend to be more ethnically homogenous than the population in the same geographic area, and contributions to community public goods are higher in less ethnically heterogeneous communities (Gugerty, 2007; Miguel and Gugerty, 2005).

6. Conclusions

In our experimental study in a Nairobi slum, women were more likely to cooperate with other women than with men. They were more optimistic about others' contributions in same-sex than in mixed-sex groups. Men's contributions were not affected by the sex composition of the group. Women in same-sex groups contributed as much as men did, independent of the sex composition of the group. Neither men's nor women's expectations were accurate in mixed-sex groups: men were too optimistic and women too pessimistic, particularly about the other sex's cooperativeness.

We believe that our results, like experimental results more generally, are context-dependent. We ran our experiment in a context, a slum in Nairobi, Kenya, in which women are more likely to be involved in the provision of public goods, "harambee," than are men. This environment may have shaped people's expectations of one another, making men more and women less optimistic about the opposite sex's cooperativeness. In other contexts where people's lives are characterized by different gender patterns of behavior, our results could look differently.

In this context, it makes sense for institutions requiring cooperation to target women in all-female rather than in mixed-sex groups. The public good is more likely to be provided in the former than in the latter environment. At the same time, our results also raise the question of why these organizations focus on women rather than men in same-sex groups since all-male groups were just as cooperative as all-female groups. Other factors that are beyond the scope of this study may help account for this pattern, such as gender differences in preferences for public goods and the use of household income. Anderson and Baland argue that among residents in a Nairobi slum, men have a greater preference for present consumption (e.g., alcohol) whereas women prefer spending money on indivisible goods such as school fees (see Duflo, 2005 for a more general discussion of this phenomenon in other developing countries).

Methodologically, our study shows that experimentalists may benefit from better understanding the context in which their experiment takes place. If we are able to represent some key aspects of people's decision environments outside of the laboratory, experiments may help us to uncover why people make the choices we observe. Such evidence could inform policy makers wishing to change people's behavior. In our context, women's beliefs about others' cooperativeness in mixed-sex groups makes these groups less successful in providing public goods than same-sex groups. Thus, policy makers may either focus on same-sex groups, or else try to affect women's beliefs in mixed-sex groups.

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Appendix A

Table A.1
Definition of variables.

Variable	Definition
C_i	Amount contributed in Public Goods game
$E_i(\hat{C}_{-i})$	The answer to the following question: "On average how much did you expect the other people in your group would send?"[*]
$\hat{C}_{-i}$	The average actual contribution of the other three group members in one's group
Female	Dummy that takes on a value of 1 for women and 0 for men.
Mixed	Dummy that takes on a value of 1 for mixed-sex groups and 0 for same-sex groups (either all female or all male groups)
Female mixed	Dummy that takes on a value of 1 for females in mixed-sex sessions and 0 otherwise
ROSCA	Dummy that takes on a value of 1 for ROSCA members and 0 for non-members.
Ethnic	$1-\sum(\text{race}\%)2$ where race% = proportion of people in the session identifying themselves as race = {Kikuyu, Kamba, Kisii, Luhya, Luo, Other}
Names	% of people in the session the individual knows by name
Log Income	Log of previous month's income
Order	Dummy for Trust Game played first

[*] This question was intended to elicit per person expected contribution, but some people may have interpreted the question as referring to the total contribution for the other three people. Thus there may be some measurement error inflating the true $E(C)$.

Table A.2
Summary Statistics, Mean, (standard deviation), [observations].

Experimental Behavior

	Men			Women			All		
	C_i	$E_i(\hat{C}_{-i})$	$\hat{C}_{-i}$	C_i	$E_i(\hat{C}_{-i})$	$\hat{C}_{-i}$	C_i	$E_i(\hat{C}_{-i})$	$\hat{C}_{-i}$
Same	**31.90%**	**38.80%**	**32.13%**	**30.72%**	**39.10%**	**30.71%**	**31.32%**	**38.94%**	**31.43%**
	(0.25)	(0.27)	(0.15)	(0.22)	(0.29)	(0.12)	(0.23)	(0.28)	(0.14)
	[58]	[58]	[58]	[56]	[56]	[56]	[114]	[114]	[114]
Mixed	**34.10%**	**36.88%**	**25.73%**	**21.16%**	**25.74%**	**30.04%**	**27.62%**	**31.38%**	**27.88%**
	(0.24)	(0.24)	(0.11)	(0.14)	(0.21)	(0.15)	(0.21)	(0.23)	(0.14)
	[78]	[77]	[78]	[78]	[75]	[78]	[156]	[152]	[156]
All	**33.16%**	**37.70%**	**28.46%**	**25.14%**	**31.46%**	**30.32%**	**29.18%**	**34.62%**	**29.38%**
	(0.25)	(0.25)	(0.13)	(0.18)	(0.25)	(0.14)	(0.22)	(0.25)	(0.14)
	[136]	[135]	[136]	[134]	[131]	[134]	[270]	[266]	[270]

Session and Individual Characteristics

	Men	Women	All
ROSCA	**16.91%**	**38.06%**	**27.41%**
	(0.37)	(0.49)	(0.45)
	[136]	[134]	[270]
Ethnic	**74.20%**	**72.40%**	**73.30%**
	(0.04)	(0.05)	(0.05)
	[136]	[134]	[270]
Names	**5.00%**	**7.00%**	**6.00%**
	(0.05)	(0.07)	(0.06)
	[134]	[134]	[268]
Income (Ksh)	**4324.83**	**2721.27**	**3528.48**
	(3096.95)	(2568.95)	(2953.09)
	[136]	[134]	[270]

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