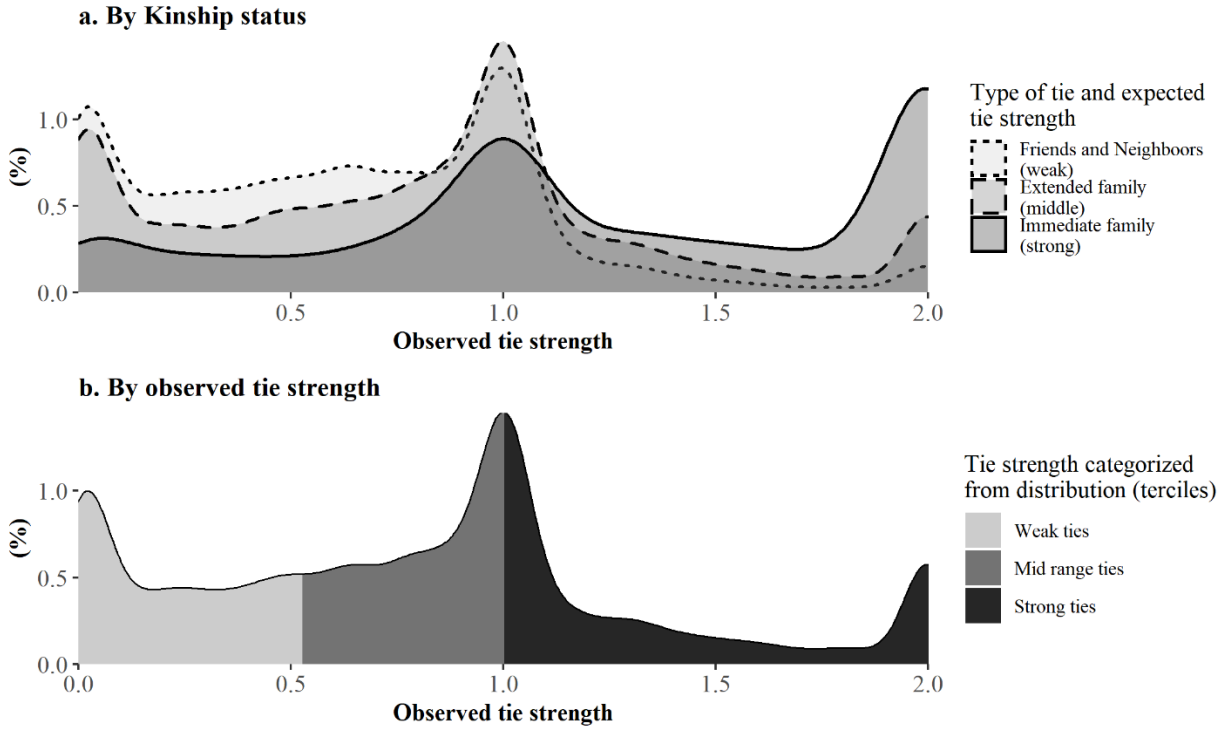
Who Matters Most? Migrant Networks, Tie Strength, and First Rural–Urban Migration to Dakar

Online Supplemental Material

Yacine Boujija, Simona Bignami, Valérie Delaunay, and John Sandberg

Figure A1 : Distribution of observed tie strength, by kinship status (a) and categorized from the observed distribution into terciles (b).



Source: compiled by authors, NSNHP main survey, 2014

Table A1. Hazards of first migration to the capital Dakar. Coefficients for the control variables omitted from tables 1-3. Adults aged 16 and older in *Yandé*, 2014-2018: hazard ratios (std. error).

	1.M1	**1.M2**	**1.M3**	**2.M1**	**2.M2**	**2.M3**	**3.M1**	**3.M2**	**3.M3**	**3.M4**
(Intercept)	0.00 ***	0.00 ***	0.00 ***	0.00 ***	0.00 ***	0.00 ***	0.00 ***	0.00 ***	0.00 ***	0.00 ***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Entry Age	1.03 **	1.03 **	1.03 **	1.03 **	1.03 **	1.03 **	1.03 **	1.03 **	1.03 **	1.03 **
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
(Entry Age)^2	1.00 **	1.00 **	1.00 ***	1.00 **	1.00 **	1.00 **	1.00 ***	1.00 ***	1.00 ***	1.00 ***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Woman	0.65	0.64	0.64	0.61	0.60 †	0.58 †	0.64	0.68	0.64	0.66
	(0.20)	(0.20)	(0.21)	(0.19)	(0.18)	(0.18)	(0.21)	(0.21)	(0.21)	(0.21)
Education (Primary)	1.25	1.18	1.03	1.27	1.28	1.28	1.24	1.35	1.27	1.25
	(0.45)	(0.44)	(0.39)	(0.47)	(0.47)	(0.47)	(0.45)	(0.49)	(0.46)	(0.46)
Education (Middle)	1.67	1.57	1.42	1.72	1.46	1.44	1.64	1.82	1.62	1.65
	(0.64)	(0.61)	(0.56)	(0.66)	(0.58)	(0.57)	(0.63)	(0.68)	(0.63)	(0.65)
Education (H-S +)	2.36 *	2.07 †	1.71	2.42 *	1.96	1.98	2.30 *	2.40 *	2.26 *	2.31 *
	(0.94)	(0.87)	(0.74)	(0.96)	(0.84)	(0.85)	(0.94)	(0.95)	(0.93)	(0.98)
Married (TV)	0.69	0.67	0.66	0.75	0.72	0.74	0.68	0.72	0.67	0.66
	(0.26)	(0.26)	(0.26)	(0.28)	(0.28)	(0.29)	(0.26)	(0.27)	(0.25)	(0.25)
Religion (Christian)	2.06 *	2.06 *	2.24 *	2.17 *	1.97 †	2.02 *	2.05 *	1.84 †	2.04 *	2.11 *
	(0.71)	(0.73)	(0.81)	(0.75)	(0.70)	(0.72)	(0.71)	(0.62)	(0.71)	(0.73)
Religion (Other)	0.25	0.22	0.17 †	0.24	0.21	0.20	0.24	0.26	0.24	0.24
	(0.25)	(0.22)	(0.18)	(0.24)	(0.21)	(0.20)	(0.24)	(0.26)	(0.25)	(0.24)
No. of HH residents	1.01	1.01	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
No. of current migrants from HH	1.00	1.00	1.00	0.99	0.99	0.99	1.01	1.02	1.01	1.01
	(0.05)	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)	(0.06)
Relative material wealth	0.77 †	0.75 *	0.75 †	0.81	0.81	0.79	0.75 *	0.78 †	0.74 *	0.75 *
	(0.11)	(0.11)	(0.11)	(0.12)	(0.12)	(0.12)	(0.11)	(0.11)	(0.11)	(0.11)
Relative agricultural wealth	1.07	1.09	1.15	1.10	1.13	1.12	1.09	1.09	1.10	1.11
	(0.18)	(0.19)	(0.20)	(0.19)	(0.19)	(0.19)	(0.18)	(0.19)	(0.18)	(0.19)
Proportion of HH under 15	1.83	2.14	1.69	1.80	1.35	1.33	1.73	1.66	1.84	2.13
	(1.77)	(2.11)	(1.67)	(1.72)	(1.29)	(1.30)	(1.67)	(1.63)	(1.79)	(2.11)

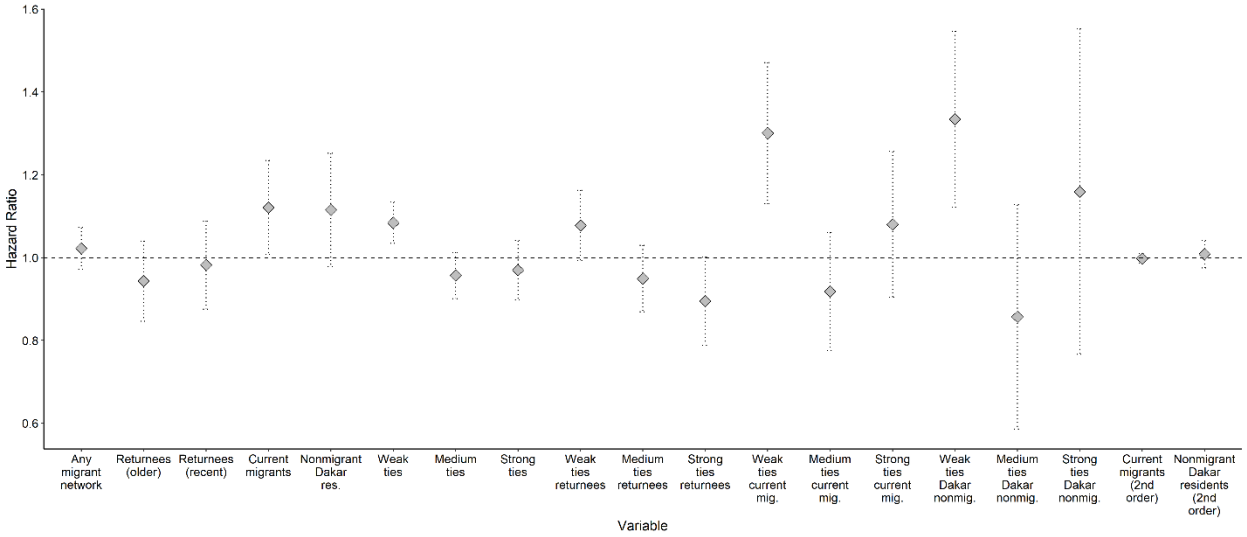
Proportion of HH over 60	3.14	2.55	1.00	2.75	2.06	2.16	4.72	3.59	3.56	2.82
	(6.73)	(5.55)	(2.29)	(6.02)	(4.65)	(4.95)	(10.05)	(7.73)	(7.70)	(6.05)
Hamlet's migration prevalence	0.95	0.83	0.80	0.57	0.67	0.67	1.21	1.35	1.09	1.01
	(0.96)	(0.84)	(0.80)	(0.59)	(0.70)	(0.71)	(1.22)	(1.41)	(1.14)	(1.05)
Personal network size (cited alters)	0.93 **	0.93 **	0.93 **	0.93 **	0.94 **	0.93 **	0.94 *	0.96 †	0.94 *	0.94 *
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)

Source: compiled by authors NSNHP main survey 2014
Notes: † $p < 0.1$, * $p < 0.05$. **$p < 0.01$, ***$p < 0.001$

Figure A2. Correlation coefficients of main migrant network specifications

Figure A2 presents the Pearson correlation coefficients for the associations between the different migrant network measures used in this paper. The associations between these are generally moderate, with the exception of those between most other measures and the size of respondents' migrant networks overall ('any migrant network'). This is expected since this variable encompasses all other first order measures of migrant network size. Second order ties to current migrants are moderately correlated with first order ties to returnees and current migrants (0.45 each) as one might expect, as the two former are likely to have first order ties to current migrants. The same holds true for second-order ties to Dakar nonmigrants, though the correlation of this with those variables is weaker (0.36 and 0.19, respectively). We also observe moderate associations between current migrants in network, current migrants from the same household, current migrants in the same hamlet (neighborhood) and 2nd order ties to current migrants. This is likely because there is some level of overlap between some of these variables. Variables indexing tie strength to a migrant network have the only negative associations. This is also to be expected, as more strong ties implies remaining ties are more likely to be weaker.

Figure A3. Hazards of first migration to the capital Dakar. Zero-order associations, by selected migrant network specifications. Adults aged 16 and older in *Yandé*, 2014-2018.



Note: The figure above presents the zero-order relationship of all migrant network specifications defined throughout the paper with the hazards of migration. Some of these variables are simple decompositions/interactions of our core network variables. For this reason, simple consideration of any of these variables alone has little value (e.g., looking at weak ties to nonmigrant Dakar residents, without considering other Dakar residents or other weak ties). Also, as mentioned in the paper, these variables do not share the same distribution range (eg. second order ties), making a comparison of these coefficients even less informative.

Table A2. Conditional hazards of first migration to the capital Dakar: unconditional and sibling fixed-effects specifications: hazard ratios (std. error).

	m1a (unconditional) exp(coef)	***m1b (fixed effect)*** exp(coef)	***m2a (unconditional)*** exp(coef)	***m2b (fixed effect)*** exp(coef)
Entry Age	1.09	0.86	1.10	1.09
(Entry Age)^2	0.99	1.00	0.99	1.00
Primary	1.32	0.00		
Middle school	0.26 †	0.00 **		
Highschool +	0.65	0.00 **		
Personal network size	0.84 *	0.61 *	0.87 *	0.60 **
Previous returnee >5yrs	1.12	0.67	1.13	2.40
Recent returnee <5yrs	0.66 †	0.16 *	0.80	0.46 †
Current migrants	1.64 *	11.22 **	1.38 *	5.05 *
Dakar nonmigrants	2.07 **	38.92 **	1.57 *	5.18 **
Person-months	1662	1662	1662	1662

Source: compiled by authors NSNHP main survey 2014
Notes: † $p < 0.1$, * $p < 0.05$. **$p < 0.01$, ***$p < 0.001$

Within-siblings conditional logit (fixed-effects) analysis

As noted in the manuscript, an alternative to the survival models specified would be a within-sibling fixed-effects (conditional logit) model. There are numerous problems with such an analysis using the present data. First, our analytic sample is of a relatively small population of never-migrants (N = 549), which is considerably reduced once we apply the required restrictions needed to estimate a sibling fixed-effects model. Reliable parental identification, necessary for sibship identification, is only available in the HDSS data for individuals born after 1983 (when the first census was conducted). This restricts our sample to 158 respondents for whom we can definitively identify their parents (and through these, siblings). Conditional logit models will only estimate over respondents from sibships of more than one where at least one has migrated, which therefor exhibit within-cluster variation. In sum, these restrictions leave us with a very limited sub-population for analysis of 42 respondents, with sibling-variant controls to estimate along with the independent variables.

With these limitations in mind, table A2 presents estimates of these models analogous to model 2 in table 2 from the manuscript. Model 1a presents estimates for comparison of an unconditional logit model on the limited analytic sample of 42 respondents where sibship, defined as having the same father, is the clustering unit. Variables which did not vary within sibships (household and hamlet characteristics, and religion) or exhibited very little variation (matrimonial status and sex) were omitted. Model 1b estimates the conditional logit (fixed-effects) regression on this sample.

These models were estimated without respondents' educational attainment in models 2a and 2b, as the estimates of network exposure appear to be highly sensitive to their inclusion, potentially because of a strong association between siblings' educational attainment or due to collinearity with educational attainment within their network.

Model 1a presents estimates of an unconditional logit model on the limited analytic sample of 42 respondents where sibship, defined as having the same father, is the clustering unit. Variables which did not vary within sibships (Household and Hamlet characteristics, and religion) or exhibited very little variation (matrimonial status and sex) were omitted. Model 1b estimates the conditional logit (fixed-effects) regression on this sample. These models were estimated without respondents' educational attainment in models 2a and 2b, as the estimates of migrant exposure appear to be highly sensitive to their inclusion, likely because of collinearity with educational attainment within their networks.

Model 1a, which is the direct analogue (constraining sibling-invariant effects to zero) to model 2 from table 2 in the manuscript, shows a similar pattern of association between the migrant exposure variables and first migration seen there. Both numbers of current migrants and Dakar non-migrants in the siblings' networks have a positive associations with the hazard of first migration, the latter being slightly larger in magnitude and stronger in significance than the former. While the association between the number of prior returned migrants and first migration hazard is also similar to that seen in the analysis in the manuscript, the number of recently returned migrant alters was associated with a marginally lower hazard of first migration in the model including respondents' educational attainment. This difference is attenuated when respondents' education is not included in the specification as seen in model 2a.

These effects are all increased (in both magnitude and significance) when looking at differences within siblings in the conditional models. The larger magnitude of the negative association between knowing recent returnees and the likelihood of first migration in these models may be partially explained by the household migration strategies if households with more recent returnees are less likely to need to send additional migrants.

These models seem to strongly validate our conclusions of strong significant network effects from a network currently residing in Dakar and conflicting results for returnees. The caveats associated with these models, however, prevent us from putting too much weight on their inferential power.