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Measuring Children's Living Arrangements in Rural South Africa: A Comparison of Approaches and Application to Schooling Outcomes

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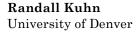**Sangeetha Madhavan**
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Short Title: Living Arrangements in South Africa

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Abstract

Demographers have long been interested in the relationship between children's living arrangements and children's well-being in sub-Saharan Africa. In this paper, we compare two ways of representing co-residence of children – structural and kin presence – to advance our understanding of how living arrangements influence educational attainment in rural South Africa. The data come from the Agincourt and Health Demographic Surveillance System with a sample of 22,997 children aged 6 – 18. The results show that 1) whereas children live in a diverse set of structural arrangements, no one type of kin dominates; 2) the optimum family structure in terms of educational attainment is nuclear with adult siblings but 3) the presence of a grandparent and adult siblings provides some additional benefit particularly for boys' education when there is only one parent; and 4) living with one parent in a vertical structure is better than being in a lateral structure particularly for boys.

Keywords: household, extended kin, children, South Africa, education

Introduction

Demographers have long been interested in the relationship between children's living arrangements and children's well-being in sub-Saharan Africa. Living arrangements in most of these studies refers to co-residential living arrangements or simply, the household. The people that children live with are seen as conduits of physical and social capital which, in turn, is a key factor influencing the well-being of children. For starters, parental presence, particularly that of mothers, has been shown to be critical for outcomes such as educational attainment (Lloyd and Blanc 1996; Townsend et al. 2002). Extended kin have also long been recognized as critical players in the lives of children (Desai 1992; Lloyd and Desai 1992; Sear et al.2002) though studies that have examined the effects of extended family arrangements on well-being have arrived at inconsistent findings (Buchman 2000; Doan and Misharat 1990: Gage et al. 1996). More recently, a number of studies have focused on the presence of specific kin such as grandparents, finding that grandmothers have a positive influence on educational outcomes (Parker and Short 2009) and birthweight (Cunningham et al. 2011). Recent studies of societies affected by HIV/AIDS have postulated the importance of kin in the care of children (Ankrah 1993; Hill et al. 2008; Hosegood et al. 2007), yet few studies have tested these assertions quantitatively.

Despite the growing knowledge gained from studies of family structure, and particularly, extended kin, we have yet to clearly understand the pathways through which co-residential living arrangements influence children's well-being because most studies to date have focused on simplistic markers of household structure – nuclear vs. extended, number of generations, household size – due in part to the lack of data. In this study we push this literature forward by 1) comparing two ways of representing co-residential arrangements and 2) estimating the effects of each on children's schooling attainment in a rural community in South Africa. The two approaches – structural and kin presence – capture different dimensions of co-residential organization. Whereas structural places emphasis on the extent of nucleation and the generational contours, kin presence is concerned with the availability of specific kin delineated by age, gender and type of kinship (maternal vs. paternal). Our ability to address these relationships is

facilitated by the unique Agincourt Health and Demographic Surveillance System, which has tracked demographic change in a former homeland in rural Mpumalanga Province since 1992. We use a wide range of sources of kinship data to reconstruct kinship connections that might otherwise be unobserved or unresolved in other data sources. This affords us a unique opportunity to develop robust indicators of household structure and kin presence from the perspective of children.

The value of this analysis can be appreciated in three ways. One, it advances our conceptual and methodological grounding in capturing what co-residential living arrangements actually provide for children. In other words, rather than take the household to be a "fact of life" we need to interrogate how closely our conceptualization mirrors lived social reality (Randall et al. 2011) and assess what type of explanatory power we actually get from each type of measurement. Two, as a result of apartheid era policies, high levels of unemployment and cultural preference, Black family organization defies simplistic, conventional categorization. Finally, Black children in rural South Africa continue to face large disadvantages in educational attainment compared to other racial groups underscoring the need to better understand which aspects of household arrangements matter for educational outcomes. Taken together, there is a clear need to improve our ability to measure living arrangements which, in turn, will elucidate the pathways through which particular living arrangements impact children's educational attainment in South Africa and elsewhere.

Conceptual Background

The study of co-residential living arrangements has a long history in the social sciences both as a component of social organization and as a determinant of well-being for children and adults. Whereas anthropologists have long challenged its centrality in the social organization of societies (Guyer 1981; Hammel & Laslett 1974; McNetting et al. 1984; Yanagisako 1979), it remains important conceptually and is the most common unit of data collection in most survey and census based research. Van de Walle's (2006) book provides a good overview of the value and limitations of the household "concept" as it is

used in surveys and censuses in sub-Saharan Africa. He starts the book by acknowledging that researchers differ on the definition of a household, and the extent to which it reflects the social reality of Africa. However, the book underscores the importance of the household as both a statistical and social unit of analysis particularly to demographers. Therefore, it is vitally important to understand what we are actually capturing through different measures of co-residential arrangements, the extent to which each approach explains variation in selected outcomes and the different interpretations of effects that result.

The household can be seen as "the basic social unit which encapsulates kinship, residence patterns and economic organization" (Harrison 2007). Because the household is also a site of social reproduction, we would add children's (and adults') caregiving arrangements as another important dimension. All four dimensions ultimately provide the framework for the distribution of resources amongst household members. Resources are not only economic but also include labour, emotional, social and moral support. If we adopt an altruistic model of household functioning (Becker 1981), all members would work towards the good of the unit through an optimal sharing of resources. This model has been challenged by scholars who have stressed the conflictual nature of household organization particularly along lines of gender (Folbre 1986; Sen 1990) and age (Meillasoux 1981). In such a view, resources are not equitably distributed amongst household members with some member benefitting more than others. It is our view, in line with many others, that living arrangements vary on a continuum from highly cooperative to highly conflictual with some arrangements encompassing both.

One way to represent cooperation and conflict is through the lens of household structure. The structural approach, as we use it, refers to the generational contours and extent of nucleation in the household from a child's perspective. Nuclear arrangements, i.e. only parents and children, are often identified with lower fertility and changing values about family obligations (Bongaarts 2001; Mberu 2007). In turn, they are likely to be cooperative because there are fewer competing interests. Within extended arrangements, there is likely to be variation in the extent of cooperation and conflict depending on the type of extension.

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By vertical extension, we mean the presence of multiple generations of adults whereas lateral refers to the presence of adult siblings of parents who comprise the same generation as parents. It should be noted that one's own adult siblings are not counted as a vertical extension because they are part of a nuclear arrangement. We might expect more cooperation in vertical arrangements in which there is less competition for resources among members of similar ages as is found in lateral arrangements. Moreover, we might also expect vertical arrangements that are contiguous to be more cooperative than skipped formations because economic and caregiving pressures are greater in the latter. However, it is possible that members of a skipped formation are forced to cooperate in order to optimize the use of limited resources. Structures that encompass both vertical and lateral features would exhibit both cooperation and conflict. For example, in large extended family arrangements, members may coalesce around certain issues (e.g. care of the sick) but may be in conflict over other matters (e.g. major purchases or paying school fees for children's education). Finally, structures absent of vertical or horizontal adult kin, i.e. "lone mother" households, while free of conflict, do not offer the safety net in terms of financial and practical support found in multigenerational households (Casper and Bianchi 2002; Haider and McGarry 2006) though even amongst this group, variation has been noted (Kanji 2004).

While structure may be important, another way to think about living arrangements is through the lens of kinship and, in particular, the presence of particular types of kin. Such a view makes an a priori assumption that particular kin types have specific value based on factors such as closeness of relationship, common lineage, shared gender and/or age based seniority. Anthropologists have long demonstrated that allegiance based on shared lineage is found in many African societies (Fortes 1958; Goody 1958). For example, in matrilineal societies, having maternal kin may be more beneficial (though not always) than having access to paternal ones. However other factors, e.g. low marriage rates may necessitate greater reliance on maternal kin, particularly maternal grandmothers, aunts and uncles, as has been shown to be the case in South Africa (Preston Whyte 1981). Further variation may be seen within kin type based on gender and age. Women tend to take on more responsibility for caregiving than men and, therefore, may

be more valuable to live with (Rosaldo and Lamphere 1974). However, men's higher income earning potential may give them greater value. The presence of the elderly may be valued in gerontocratic societies (Stucki 1995) but their value is increasingly rooted in their active participation in income generation through pensions (Case and Deaton 1998). Taking these dimensions into consideration, we focus on the following kin relationships: grandmothers, grandfathers, aunts and uncles each further specified by maternal or paternal type. This approach expands the almost exclusive focus in the extant literature on grandmothers to include other potentially critical kin.

Moving one step further, kin presence can be approached using an egocentric approach in which the kinship support networks of individuals living in the same household can be understood not as a common household attribute but as an attribute that varies across individuals, depending on the specific kin that may be available to each child in a household. We take an example of a multigenerational household comprised of an older woman, who lives with a married son and daughter, their spouses, and one granddaughter from each couple. Already, the two granddaughters may experience slightly different kinship constellations. Both girls live with their parents and both live with a grandmother, but in fact, one lives with her mother's mother and another lives with her father's mother. Suppose now one girl loses both her parents. The household structure is changed, but the change hardly falls in parallel on the two girls, one of whom has both parents while the other merely has an aunt and an uncle. In the past, the ability to examine living arrangements of specific children has been limited by the lack of egocentric kinship data linking all members of a household to one another. This study addresses this gap using a unique dataset from Agincourt, South Africa.

By using these conceptual anchors, we are better positioned to address the following questions: What do we learn about children's positioning using structural and kin presence approaches? Is it the structure of the household reflected in dimensions such as number of generations, extent of nucleation, and verticality vs. laterality that makes a difference between a child doing well and failing in school? Alternatively, is it

the presence of particular kin such as grandmothers or maternal aunts? Or perhaps the optimal conditions necessitate parental presence embedded within specific structures? We now describe the data and methods that will be used to operationalize the concepts we have outlined.

Data and Methods

Data

The data for this analysis come from the Agincourt and Health Demographic Surveillance System (AHDSS) conducted in 21 villages (another 3 villages were added in 2008) located in former homeland areas in the province of Mpumalanga in northeastern South Africa. The Agincourt sub-district is typical of much of southern Africa in three important respects: 1) the land is insufficient to support the population through subsistence agriculture or other local activities; 2) there are very few local employment opportunities; and 3) the population has high levels of migration and mobility. The population of about 90,000 lives in 28 villages established through forced resettlement between 1920 and 1970. All villages have water provided through neighborhood taps and at least one primary school and most have electricity and a secondary school. The main languages spoken in the area are Shangaan, sePedi and seSotho. Traditionally, most families have lived in multigenerational, extended family arrangements in which adult siblings live close to one another (Junod 1962; Niehaus 2001) though these patterns are undergoing change as a result of increased female migration and alteration in the labor market.

The baseline census was conducted in 1992 followed by annual visits to each household in the site to update births, deaths, and migration and individual status such as residence, union, relationship to household head, and education of every household member. Household socioeconomic status is based on ownership of assets such as cattle, car, and cell phone as well as access to amenities including drinking water and sanitation. Migration has been classified into two categories. A permanent migrant is defined as a person moving into or out of a household with a permanent intention. Someone who left the

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household permanently since the last update will not appear on the subsequent household roster. A temporary migrant, on the other hand, is someone who is identified as a member of the household but has spent six or more months of the previous year out of the household for employment or other reasons.

Previous work on living arrangements using the AHDSS data has shown that between 1996 and 2003, there was considerable change between household types. Projections of long-run household change pointed to an increase in the proportion of three generation linear households, and the decline of "simpler" household types such as single person households and nuclear households (Wittenberg and Collinson 2007). Related work on changes in household composition between 1993 and 2003 showed an increase in the proportion of female headed households (Madhavan and Schatz 2007). In examining the influence of living arrangements on outcomes, previous work using data from 1997 found that the presence of parents benefitted educational attainment for all children but having a migrant father had a positive effect only for older children and female headship had no effect (Townsend et al. 2002). More recent analysis examining the correlates of children's mobility found that the presence of women who can act as maternal substitutes lowers the likelihood of children moving when the mother is a labour migrant or when she is deceased (Madhavan et al. 2012). While providing important findings, these studies have measured extended living arrangements based only on headship, age-sex composition of the household and generational structure, making it difficult to identify the critical dimensions and the pathways through which effects are felt. Yet the richness of the AHDSS data also enable the explicit linkage of children to specific coresident kin.

Sample and Methods

We use data from the 2002 update which covered a population of approximately 70,000 people living in 11,900 households. We chose 2002 because it offered high quality data on kin relationships and will provide a robust baseline for future work that will examine change over time. Our analytical sample includes 22,997 children aged 6 - 18 years old who were neither parents themselves nor lived with a

partner or partner's family. The last restriction was imposed to avoid combining caregiving received by

children and caregiving given to children in the case of young parents, both of which are very different

contexts.[1] Our data on kin relationships come from two sources: 1) household rosters that collect

conventional data on sex, age and relationship to household head and 2) a social connections database

(SCDB) that uses all waves of the AHDSS to derive robust indicators of both intra and inter household

connectivity from the child's perspective. Collection of data using household rosters almost always begin

with the identification of the "household head," the person deemed to be responsible for the overall

welfare of the household. In many communities in sub-Saharan Africa, this person tends to be the oldest

male (Posel 2001). All other household members are assigned a relationship code that indicates

relationship to the head. If we wanted to identify relationships from the perspective of children, we

would need to reconstruct this based on the original set of relationships. While this is relatively

straightforward in nuclear and/or small households, it becomes increasingly difficult to do so in large

households extended along both vertical and lateral dimensions. As a result, the process to identify

kinship relationships from the perspective of children is likely to produce a number of unresolved

relationships, so few studies take this approach. To address this issue, we draw on data that offers direct,

robust kinship relationship data from the child's perspective. The SCDB database was developed using a

more comprehensive list of relationships populated from other sources such as parent ID linkages, union

ID linkages, relationships formed over past and future co-residence episodes, and the recursive

reconciliation of all those relationships to one another.

For each child, we constructed an "egocentric" list relating all coresident adult household members (age

19+) to the child, including 87,199 adult coresident alters, or 3.79 per child. We include only alters age

19+ because they are most critical for channeling resources to children. However, because children are an

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[1] As a more robust approach to excluding teen parents, we instead restricted the sample to children age 6-15, to focus on children who were before childbearing age. For both males and females, all coefficients were of the same sign and significance level as in the age 6-18 year old models.

indicator for the competition for resources, our regression models control for total number of children under age 18 living in the household. We then used the SCDB to code the relationships of coresident alters to the child. We were able to identify the exact relationships for 96.2 % of alters (kin relationships) with high confidence. We aggregated counts of coresident alters according to kinship type, created dichotomous indicators for the presence of any kin of that type, and subsequently developed structural indicators of coresident kinship composition as described in the next section. The data were then collapsed to have a single observation for each child. It should be noted that both the kin presence and structural are "egocentric" in that the categories are based on the relationship to the child.

We employ OLS regression models to examine the relationship between living arrangements as specified in each of the approaches and educational outcome. The outcome measure for the OLS models is pace of education which is modeled as a continuous variable that captures the difference between years of schooling attained – age + a constant for normal age of entry into school which is 6 in this community (Kuhn 2006). A pace of 0 would mean that the child is meeting grade for age expectations. A pace less than 0 would mean that the child is falling behind and a pace greater than 0 means that the child is moving faster than expected. As shown in Table 1, the mean pace for boys is .7 and for girls, .3. To test the sensitivity of our outcomes, we also tested dichotomous models of 1) whether a child had fallen behind by at least two years (grade for age <= -2), and 2) whether a child was ahead by at least one year (grade for age >= 1). These results yielded few substantive differences from the linear model, which we present.

We control for age of child, educational attainment of the household head, whether the house is headed by a refugee, whether there are labour migrants in the household, and number of children under the age of 19 in the household (not including focal child) and the number of adults in the household. All analyses are stratified by sex of the child. To control for correlated standard errors arising from having multiple children from the same household, we use the cluster command in STATA at the household level. A

comparison of goodness of fit statistics will provide some insight into what the models are and are not

capturing and whether one approach is better than another. It will also help identify parsimonious models

of co-residential arrangements that identify which dimensions are crucial to operationalize in any analysis

of family structure and children's outcomes. Table 1 shows the means of our key variables.
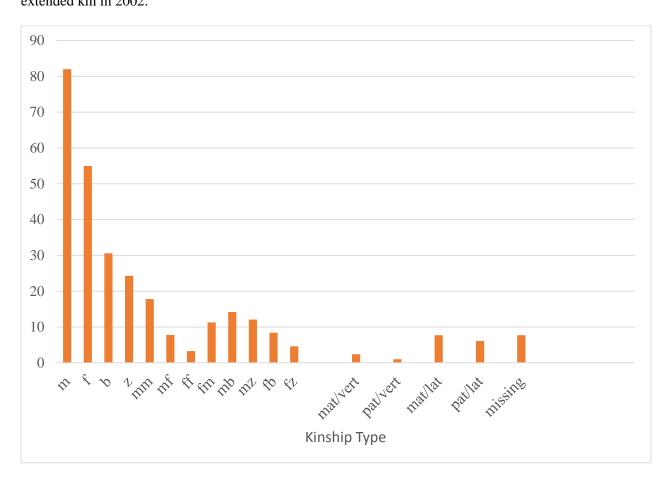
Table 1: Means and percentages of key variables, by sex, for children aged 6-18, Agincourt 2002

	Male		Female	
	Mean	S.D.	Mean	S.D.
Years of education	4.2	3.1	4.5	3.2
Education pace	-0.7	2.0	-0.3	1.8
Age	11.9	3.7	11.8	3.6
Household Composition				
Both parents present	52%		51%	
Mother, no father	31%		31%	
Father, no mother	3%		3%	
Neither parent present	14%		15%	
Any grandparent present	30%		31%	
Any aunt/uncle present	29%		30%	
Any adult sibling present	42%		41%	
Any unknown relation present	7%		8%	
Children age <=18	4.9	2.7	4.9	2.7
Adults age 19+	3.9	2.2	3.9	2.2
# labor migrants	0.96	1.03	0.97	1.07
Household head characteristics				
Education level of household head	3.4	3.9	3.4	3.9
Refugee headed	37%		36%	
Observations	10557		10223	

We employ an iterative strategy based on theory, our own knowledge of the community and the data itself to describe the co-residential living arrangements of children and the effects of these arrangements on educational attainment. In doing so, we start from an initial structural model informed mainly by the literature, move to a detailed examination of the presence of specific kin types controlling for the presence of one's own adult siblings, and finish with a more refined, parsimonious model that reflects the local conditions of Agincourt but also amenable to adaption in other contexts. We begin by exploring the unique coresidence conditions of the Agincourt area.

Results

Figure 1 shows the distribution of children living with mothers, fathers, siblings and different types of extended kin in 2002.

Note: Kinship relationship codes are derived from the eight elemental relationships, (M)other, (F)ather, (B)rother, (Z)sister, (S)on, (D)aughter, (H)usband and (W)ife;

Figure 1: Distribution of co-residence with parents, siblings and extended kin for children aged 6-18, Agincourt 2002

Consistent with expectations, we find that most children (82%) live with their mothers and about 55% with their fathers. Thirty percent live with a brother and 25% live with a sister. Interestingly, while half of children live with some kind of extended kin, less that 20% live with any particular type of maternal extended kin, namely, grandmothers (mm), uncles (mb) and aunts(mz) and less that 10% live with paternal extended kin (fm or fb). Other types of maternal or paternal vertical kin are exceedingly rare while living with other types of maternal or paternal lateral kin is somewhat higher between 7-9% of children. We note that 7.7% of children live in households with at least one unidentified alter. In analyzing possible bias in this sample, we found that the majority of unresolved relationships are those in which the alter is aged 19-30 and unrelated or very distantly related, and so unlikely to influence child schooling progress. We nevertheless include controls for kin with missing relationship status in all our models.

Our initial structural typology is based on the literature and fieldwork conducted at the site and is an attempt to develop a parsimonious, mutually exclusive categorization that is meaningful and analytically useful. The seven categories are: 1) exclusive nuclear defined as having only both parents and no other kin; 2) exclusive continuous vertical (one or both parents, grandparents); 3) exclusively lateral (one or both parents, aunts, uncles); 4) both vertical and lateral (one or both parent and having at least one member from vertical and lateral arrangements); 5) no parents/any kin; 6) lone mother (no kin) and 7) other. In this approach, one's adult siblings are subsumed under each of the existing categories. Other includes "lone father" "only adult siblings and/or spouses" "only adults with unknown relationships" or "no adults" and "other rare combinations." Generational divisions are determined by age and relationship.

Table 2 shows the distribution of children categorized by the structural typology of households based on the literature and what we know from fieldwork at the site.

Table 2. Distribution of structural categories for children aged 6-18, Agincourt 2002

Categories	N (%)
Exclusive nuclear (both parents)	8900 (38.7)
Extended (w/ at least 1 parent)	
Exclusive continuous vertical	1738 (7.6)
Exclusive lateral	1444 (6.3)
Both vertical and lateral	3114 (13.5)
No parent/any kin	2612 (11.4)
Lone mother	3312 (14.4)
Other*	1877 (8.2)
N	22997

*This category is a catch-all for combinations that are too small and do not fit into the other categories such as father only or adult sibling only households;

Almost 40% of children live in exclusively nuclear structures with the remaining 60% distributed over extended arrangements with at least one parent (27.4%), extended arrangements without any parents (11.4%), lone mother (14.4%) and "other" arrangements (8.2%). It is interesting to note that the proportion of children living in households having both vertical and lateral extensions is double the number of children living in either vertical or lateral households. While the proportion of children living in "lone mother" is quite high, it should be noted that this captures a cross sectional picture; it is likely that most of these households will evolve into other arrangements that include other adults over time.

We now turn to examining the relationship between residential living arrangements and educational outcomes using the structural approach. We now turn to examining the relationship between this structural typology and the pace of education as show in the OLS results in Table 3.

Table 3: OLS regression results for effects of initial structural typology on pace of education for children aged 6-18, Agincourt 2002

	Boys		Girls	
Structural Type				
	Coeff	SE	Coeff	SE
Exclusively nuclear (both parents)	Ref		ref	
Exclusively continuous vertical (both or one parent)	0.030	(0.07)	-0.026	(0.07)
Exclusively lateral (both or one parent)	-0.183*	(0.08)	-0.128	(0.08)
Lateral and vertical (both or one parent)	-0.222***	(0.06)	-0.198***	(0.06)
No parent/any kin	-0.186***	(0.05)	-0.236***	(0.05)
Lone mother	-0.239***	(0.07)	-0.243***	(0.06)
Other	-0.237**	(0.07)	-0.239**	(0.06)
Controls				
Age of child	-0.294***	(0.00)	-0.237***	(0.00)
# children < 19	-0.028**	(0.01)	-0.023**	(0.01)
# adults > 19	0.053***	(0.01)	0.064***	(0.01)
# labor migrants	0.027	(0.02)	0.020	(0.02)
Educational status of head	0.048***	(0.00)	0.047***	(0.00)
Refugee headed	-0.215***	(0.04)	-0.324***	(0.04)
R^2	0.307		0.243	
Observations	10557		10223	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Robust standard errors in parentheses. Results clustered by household ID.

Being in an exclusively continuous vertical, exclusively lateral or lateral and vertical arrangements has no effect on the pace of education net of total number of adults which has an independent positive effect and total number of children which has a negative effect. Being in a structure with either no parents and kin or only mother and no kin has the expected negative impact. Finally, being in the "other" category also appears to compromise educational attainment. The independent effects of the control variables are as expected with age of child decreasing the pace of education. Educational status of the head has the expected positive impact whereas being in a refugee headed household has a negative effect. Interestingly, number of labour migrants has no impact on educational pace. Effects are similar for boys and girls.

To ensure that we understand the effects of specific types of kin on children's schooling, we next turn to OLS models that estimate the effects of having particular types of kin on pace of educational attainment for boys and girls. We tested numerous model specifications for various types of kin, including counts and dichotomous indicators of kin presence for specific types of kin, for kin classified as lateral/vertical, and for kin classified as maternal or paternal. Because we found that only grandparents and adult siblings have any association with child schooling, the results presented here in Table 4 show the more parsimonious categorization. Model 1 is the basic model with only type of parental presence included. Model 2 includes grandparents. Model 3 includes all other kin.

Table 4: OLS regression results for effects of kin presence on pace of education for children aged 6-18, Agincourt 2002

	Parental Model		Add Grandparents		Add Other Kin	
	Boys	Girls	Boys	Girls	Boys	Girls
Parental Status						
Both parents	Ref	ref.	ref.	ref.	ref.	ref.
One parent	-0.159*** (0.04)	-0.244*** (0.04)	-0.182*** (0.04)	-0.265*** (0.04)	-0.175*** (0.04)	-0.257*** (0.04)
No parents	-0.299*** (0.06)	-0.298*** (0.05)	-0.348*** (0.06)	-0.339*** (0.06)	-0.284*** (0.07)	-0.285*** (0.07)
Kin Presence						
Any grandparent			0.108* (0.05)	0.092* (0.05)	0.186*** (0.05)	0.134*** (0.05)
Any other kin					-0.052 (0.06)	-0.032 (0.05)
Any sibling 19+					0.143** (0.05)	0.088 (0.05)
Controls						
Age of child	-0.292*** (0.00)	-0.237*** (0.00)	-0.290*** (0.00)	-0.235*** (0.00)	-0.295*** (0.00)	-0.238*** (0.00)
# children	-0.030*** (0.01)	-0.026** (0.01)	-0.029*** (0.01)	-0.025** (0.01)	-0.028** (0.01)	-0.025** (0.01)
# adults	0.046*** (0.01)	0.044*** (0.01)	0.037*** (0.01)	0.052*** (0.01)	0.027** (0.01)	0.047*** (0.01)
# labor migrants	0.022 (0.02)	0.016 (0.02)	0.023 (0.02)	0.019 (0.02)	0.030 (0.02)	0.024 (0.02)
Education of Head	0.046*** (0.00)	0.044*** (0.00)	0.047*** (0.00)	0.046*** (0.00)	0.050*** (0.00)	0.047*** (0.00)
Refugee Headed	-0.233*** (0.04)	-0.350** (0.04)	-0.225*** (0.04)	-0.343*** (0.04)	-0.218*** (0.04)	-0.339*** (0.04)
R^2	0.307	0.245	0.308	0.245	0.309	0.246
Observations	10557	10223	10557	10223	10557	10223

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Robust standard errors in parentheses. Results clustered by household ID.

Not surprisingly, parental presence exerts a strong effect on the pace of educational attainment in all the models. Children who live with only one parent (regardless of gender) or neither parent fare worse compared to those who live with both parents. This holds true for boys and girls even after controlling for age which has a negative independent effect. The presence of grandparents (model 2) is marginally beneficial for boys and girls. While the presence of other kin makes no difference, the presence of adult siblings exerts a strong positive effect for boys and the grandparent effect increases in significance for boys and girls. All the control variables behave the same way as in the structural models. All models control for the total number of adults living in the household, which is positively associated with child schooling. Coefficients could therefore be interpreted as indicating the benefit of a particular kin type above and beyond the benefit of just having additional adults. But we note that the significance of kin type coefficients does not change if we drop the control for number of adults. Given the importance of parental status over other factors, we next explore the possibility that the significance of extended kin will vary by parent status by disaggregating models according to parent status, as shown in Table 5.

Table 5: OLS regression results for effects of kin presence on pace of education, by number of parents for children aged 6-18, Agincourt, 2002

	Two Parents				One Parent				No Parents			
	Boys		Girls		Boys		Girls		Boys		Girls	
Kin Presence												
Any grandparent	-0.011	(0.08)	0.056	(0.08)	0.271**	(0.09)	0.134	(0.09)	0.446**	(0.14)	0.228	(0.12)
Any other kin	-0.084	(0.09)	-0.025	(0.09)	-0.107	(0.09)	-0.014	(0.09)	0.074	(0.15)	-0.093	(0.12)
Any sibling 19+	0.098	(0.06)	0.059	(0.06)	0.228**	(0.08)	0.175*	(0.08)	-0.026	(0.19)	-0.143	(0.19)
Controls												
Age of child	-0.282***	(0.01)	-0.213***	(0.01)	-0.299***	(0.01)	-0.260***	(0.01)	-0.332***	(0.01)	-0.272***	(0.01)
# children	-0.015	(0.01)	-0.017	(0.01)	-0.032*	(0.02)	-0.033	(0.02)	-0.076**	(0.03)	-0.084***	(0.02)
# adults	0.029	(0.02)	0.036	(0.02)	0.007	(0.02)	0.035	(0.02)	0.087	(0.03)	0.105**	(0.03)
# labor migrants	0.071*	(0.03)	0.071**	(0.03)	0.027	(0.03)	0.016	(0.03)	-0.078	(0.05)	-0.068	(0.06)
Education of Head	0.057***	(0.01)	0.049***	(0.01)	0.048***	(0.01)	0.055***	(0.01)	0.058***	(0.02)	0.045**	(0.01)
Refugee Headed	-0.160**	(0.06)	-0.294***	(0.06)	-0.244***	(0.07)	-0.351***	(0.08)	-0.244	(0.14)	-0.461***	(0.11)
R²	0.293		0.217		0.328		0.273		0.327		0.272	
Observations	5456		5262		3616		3467		1485		1494	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Robust standard errors in parentheses. Results clustered by household ID.

Children who live with both parents appear to have no added benefit from the presence of other types of kin. The presence of grandparents and older siblings is apparent in one-parent households, where the schooling of boys is positively impacted. Girls in such circumstances benefit marginally only from the presence of older siblings. In households with no parents, grandparents have a strong and positive association with the schooling of boys and their association with the schooling of girls, while positive, falls just below the 5% level of significance. Adult siblings are not significantly associated with boys' or girls' schooling in no-parent households. As in the earlier models, the presence of aunts and uncles bears no relationship to child schooling progress regardless of parental status. Interestingly, the positive effect of total number of adults is only apparent for girls in no parent households and the negative effect of number of children under the age of 19 is only apparent for boys in one parent households and in no parent households. Using these results, we move to our final model (Table 6) which shows the effects of a more refined, parsimonious structural typology that incorporates both parental and sibling presence.

Table 6: OLS regression results for effects of refined structural categories on pace of education for children aged 6-18, Agincourt 2002

	Boys		Girls	
Structural Type				
Nuclear/no adult siblings	ref		ref	
Nuclear/adult siblings	0.153**	(0.05)	0.107*	(0.05)
One or no parents/vertical and/or adult siblings	-0.023	(0.05)	-0.168***	(0.05)
One parent/no adult siblings/no vertical	-0.234***	(0.07)	-0.245***	(0.06)
No parents/vertical and/or adult siblings	-0.097	(0.07)	-0.180**	(0.07)
No parents/no adult siblings/no vertical	-0.558***	(0.12)	-0.400***	(0.09)
Controls				
Age of child	-0.295***	0.00	-0.239***	(0.00)
# children < 19	-0.027**	(0.01)	-0.024**	(0.01)
# adults > 19	0.027***	(0.01)	0.049***	(0.01)
# labor migrants	0.027	(0.02)	0.021	(0.02)
Educational status of head	0.050***	0.00	0.046***	0.00
Refugee headed	-0.206***	(0.04)	-0.336***	(0.04)
R^2	0.309		0.246	
Observations	10557		10223	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Robust standard errors in parentheses. Results clustered by household ID.

Using nuclear without adult siblings as the reference category, we find that the optimum situation, particularly for boys, is living in a nuclear family that includes both parents plus adult siblings. While being in a one or no parent household is clearly very disadvantageous, doing so in the context of a vertical structure or with adult siblings is preferable. In sum, while a vertical arrangement is a sub-optimal structure, it does offer marginal benefit in the absence of one or both parents. While we tested for the effects of a wide range of lateral or vertical/lateral living arrangements, these results were not significant and were not shown given the lack of significance of lateral kin in previous models.

Discussion and Conclusion

In this analysis, we set out to unpack the components of household co-residential arrangements of children through two approaches: structural and kin presence – and apply each approach to explaining variation in children's educational attainment in a rural community in South Africa. Perhaps the most surprising finding is the relatively limited role of extended kin in the lives of these children, a departure from the dominant narrative that emphasizes extended kin. Both approaches show that about 50% of children are living with both parents, though not necessarily exclusively. This figure is higher than what might be expected based on popular projections of African family structure and some academic research but lower than the estimates using the 1997 data (Townsend et al. 2002). It is also clear that most children share a residence with their mothers though, in about 16% of cases, it is a lone mother. It is interesting that among those children who live in extended structures, more of them live in structures that have elements of both lateral and vertical extension than in those with either one or the other. Perhaps what is most surprising is that no particular type of extended kin stands out as dominating co-residential arrangements (as fathers' mothers might in patrilineal societies or as mothers' mothers might in a context with low marriage rates). Instead, at least 8% but not more than 18% of children live with a mother's mother, mother's father, father mother, mother's brother, mother's sister, or father's brother. Mother's mothers are the most common coresident kin, but only 18% live with one.

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When examining the effects of structure and kin presence on educational attainment, we found that extended kin bore little association with the pace of educational attainment, particularly when considering lateral kin such as uncles and aunts. Our initial structural model, kin presence models, and final structural model each add to a more nuanced story of the relevant sources of coresident support. The initial structural model shown in Table 2 suggests that nuclear structures are the best arrangement for children's education. The kin presence models support this finding by showing that the presence of two parents offers a significant benefit for children and is independent of any effects of other kin. In other words, if both parents are there, very little else matters except for the presence of adult siblings which does offer some additional benefit particularly for boys. However, in situation without both parents, grandparents and adult siblings appear to at least partially substitute for the missing parent(s) though the effects are still negative compared to children with both parents. The final refined structural approach clearly shows the relative benefits of being in a vertical arrangement preferably with adult siblings when both parents are not co-resident. Lateral arrangements do not appear to yield any benefits under any circumstances.

The most important theoretical contribution of this analysis to the literature on household composition and family structure in sub-Saharan Africa is its explicit focus on the difference between household structure and composition which are often used interchangeably and in some cases, erroneously, in the extant literature. The structural approach is concerned with the general contours of living arrangements which can be represented by the extent of nucleation, generational spread and whether the extension is vertical or horizontal. The kin presence approach, on the other hand, focuses on particular dyadic relationships such as that between children and maternal grandmother or paternal uncle. Each places emphasis on different dimensions of children's social positioning – whereas the structural embeds children within a larger kin structure, the latter is concerned with how particular kin either protect or put at risk children's welfare. This conceptual difference – structure or individuals -, we believe, is critical to appreciate if our ultimate goal is to improve the welfare of children.

One benefit of taking an egocentric approach to kinship lies in our ability to see past existing assumptions about kinship, which are often highly contentious, and reconcile empirical data to theoretical knowledge. Perhaps the most surprising finding of this analysis lies in the significance of adult siblings, who appear to be as significant as grandparents and far more significant than aunts and uncles, in spite of the far greater attention paid to grandparents, aunts and uncles in the existing literature and policy dialogue. Yet previous studies in other contexts have demonstrated the important role of older siblings in children's well-being (Kuhn 2006). The role of siblings may be especially important in light of the bimodal pattern of childbearing among Black South African women in which women often have two children separated by long birth spacing (Garenne et al. 2000; Timaeus and Moultrie 2008). In this context, first children may bear special attention not merely because their mothers are often young and lacking spousal support, but because they lack an older sibling. Policies directed at improving the welfare of first children may bear further benefit years later if they become better able to provide support and assistance to their younger siblings.

In assessing the value of this work, it is important to consider some limitations. First, using a cross sectional indicator of residential arrangements to examine a cumulative process such as schooling tends to result in low explanatory power in general. We cannot, for instance, rule out that the association or lack of association between current extended living arrangements and cumulative schooling outcomes is not a reverse causation. As just one example, children who now live with aunts and uncles may have been previously exposed to far more disadvantaged living arrangements prior to the current one. We plan to pursue this line of research in future work that models schooling outcomes over time as a function of the cumulative effects of household relationships and ongoing changes in those relationships. Second, AHDSS data and the social connections database allow us to measure the effects of non-coresident kin who do not live with a child but may nonetheless play a critical role in providing material support. Numerous studies have questioned the limitations of the household as an organizing concept for measuring kinship support, and so future work will address whether kin outside the household add to our

explanatory power. Third, further refinements of the analysis presented here are possible. For example, it might be informative to cluster on sibling sets within the household to identify more robustly the effect of birth order. Finally, due to data limitations, we did not include potentially important co-variates such as access to pensions and other social grants, employment status, or temporary migration status. Despite these limitations, we believe that this analysis makes a worthwhile contribution to the ongoing discussion of family structure in all its complexity, in particular, intergenerational relationships, and living arrangements in its myriad forms and children's welfare in the African context.

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