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From desires to behavior: Moderating factors in a fertility transition

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Abstract

BACKGROUND—Extensive research in both developed and developing countries has shown that preferences and intentions for future childbearing predict behavior. However, very little of this research has examined high-fertility contexts in sub-Saharan Africa. In particular, the factors that increase or decrease correspondence between fertility desires and behavior in these settings are not well understood.

OBJECTIVE—This article documents the degree to which the desire to stop childbearing predicts fertility behavior over the short term among married women in rural southern Mozambique, a context where fertility transition is still in the early stages. Analyses test the moderating powers of individual, household, and community characteristics.

METHODS—Analyses use data from a longitudinal survey of married women of reproductive age (N=1678) carried out in 2006 and 2009 in rural areas of southern Mozambique. Logistic regression models are estimated to predict childbearing between 2006 and 2009 based on desires to stop childbearing and characteristics measured in 2006.

RESULTS—As expected, the desire to stop childbearing is strongly predictive of fertility behavior. Household wealth, local adult AIDS mortality, and being married to an unsuccessful labor migrant are associated with higher correspondence between reported desire to stop childbearing and fertility behavior.

CONCLUSIONS—Both factors related to the ability to carry out desires to stop childbearing and factors related to the strength and consistency of these desires moderate the association between desires and behaviors. Future research should expand measurement of fertility preferences to incorporate their strength and consistency as well as direction.

1. Introduction

Fertility desires and intentions are central in theoretical and empirical approaches to studying childbearing behavior. Coale's (1973) seminal formulation of demographic transition theory argues that fertility will decline when childbearing enters the "calculus of conscious choice" – that is, when having children becomes a subject about which it is possible to have preferences. Measuring fertility intentions, and determining the extent to which they predict fertility behavior, is also important for population policy and the implementation of family planning programs. Substantial evidence from more developed

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countries – and growing evidence from less developed countries – shows that preferences are associated with childbearing behavior, even after accounting for other sociodemographic characteristics. However, there is little evidence on how fertility desires predict fertility in sub-Saharan African settings, where rapid and radical socioeconomic changes coupled with a massive HIV/AIDS epidemic have placed immense strains on traditional marital and reproductive systems. In addition, the conditions under which preferences are more strongly or weakly associated with behavior are not well understood.

This article helps fill this void using unique longitudinal data collected in rural Mozambique, a country of some 23 million inhabitants in southeast Africa characterized by low levels of economic development, high HIV prevalence rates, and an early stage of fertility transition. We begin by briefly describing the predictors of wanting to stop having children; proceed to assess the association between married rural women's desires to stop childbearing and their subsequent fertility behavior; and finish by analyzing individual and community characteristics that strengthen or weaken this relationship. Results show that women married to a migrant, living in a wealthier household, and residing in villages with high adult AIDS mortality are more likely to carry out preferences to stop childbearing. Factors typically associated with contraceptive use, such as education and living near a clinic providing family planning services, do not moderate the relationship between preferences and behavior.

2. Fertility preferences and behavior

Conceptually, fertility desires and intentions represent different constructs: desires (or preferences) reflect goals or ideals, while intentions incorporate plans for action and may be more responsive to personal circumstances and constraints. A large literature in social psychology has worked to specify the relationship between desires and intentions and to predict behavior based on these measures (e.g., Ajzen 1991; Ajzen and Fishbein 1980; Jaccard and Davidson 1976; Miller 1986; Miller, Severy, and Pasta 2004). In contrast to this literature, demographic surveys rarely collect prospective measures of both intentions and desires and frequently use "intentions" as a general term to refer to both concepts.[3] The question of terminology is further complicated when analyzing data from developing countries, since surveys are often administered in local languages using translations that may not accurately capture the nuances of meaning across the terms (Kodzi, Johnson, and Casterline 2010). We use the terms "desires," "preferences," and "intentions" interchangeably in the literature review that follows, reflecting the lack of clarity in the demographic literature. Our primary independent variable is based on a question asking women whether they want to continue childbearing (see Section 5); we use "desire" or "preference" to refer to our measure. We return to the question of conceptual and empirical distinctions between desires and intentions in Section 4.

By now, there is ample cross-national evidence that fertility intentions and preferences predict fertility behavior. The predictive validity of these attitudinal measures has been demonstrated in developed countries (Barber 2001; Bongaarts 1992; Monnier 1989; Quesnel-Vallée and Morgan 2003; Rindfuss, Morgan, and Swicegood 1988; Schoen et al. 1999; Thomson 1997; Westoff and Ryder 1977; Williams, Abma, and Piccinino 1999) as well as in developing countries at various intermediate stages of the demographic transition (Bankole 1995; Bankole and Westoff 1998; Da Vanzo, Peterson, and Jones 2003; De Silva 1991; Foreit and Suh 1980; Freedman, Hermalin, and Chang 1975; Hermalin et al. 1979;

[3]For example, the Demographic and Health Surveys ask women whether they want more children and label these data as "fertility intentions." The National Surveys of Family Growth, the primary national data source on fertility in the United States, take a similar approach. The Generations and Gender Surveys in Europe are prominent exceptions that ask about both desires and intentions.

Kodzi, Johnson, and Casterline 2010; Nair and Chow 1980; Tan and Tey 1994; Vlassoff 1990). However, most studies in non-western settings have focused on South or East Asia, while comparatively few have analyzed fertility intentions and behaviors in sub-Saharan Africa (however, one can reference the work of Bankole 1995; Kodzi, Johnson, and Casterline 2010). This uneven distribution is mainly due to the relative scarcity of longitudinal data collected in sub-Saharan Africa.

As theorized by demographers, fertility transition is a process through which people come to develop individual preferences for smaller families rather than considering childbearing to be purely determined by God, destiny, or the social collective (Coale 1973; van de Walle 1992). Once individual plans for childbearing are formed, the ability to carry out plans can be considered a key element of the second stage of the fertility transition (McCarthy and Oni 1987). Both individuals' fertility preferences and the degree to which they implement them are contingent on their characteristics and circumstances. Thus, in both high-fertility and low-fertility contexts the association between intentions and behavior varies according to sociodemographic characteristics. For instance, the fertility behavior of older women is more consistent with reported intentions than that of younger women (De Silva 1991; Hermalin et al. 1979; Foreit and Suh 1980; Freedman et al. 1975; Nair and Chow 1980; O'Connell and Rogers 1983; Thomson 1997). For married couples, husbands' fertility preferences moderate the association between wifes' preferences and behavior (Bankole 1995; Tan and Tey 1994; Thomson 1997). In some contexts, education is also associated with higher consistency between childbearing intentions and behavior for women who want to have no more children (De Silva 1991; Foreit and Suh 1980; Freedman et al. 1975; Hermalin et al. 1979). These moderators are likely to be particularly important to understanding the role of individual intentions in a setting where the fertility transition is still in its early stages, as is the case in sub-Saharan Africa. However, previous studies on fertility preferences and outcomes in the region have not examined how individual, household, or community characteristics, aside from husbands' preferences, shape women's ability to translate fertility preferences into behavior (Bankole 1995; Kodzi, Johnson, and Casterline 2010).

In this article, we examine the extent to which the desire to stop childbearing predicts fertility behavior in rural Mozambique. Our study moves beyond previous research in sub-Saharan Africa by considering a range of factors that might strengthen or weaken the association between individual preferences and behavior. In Section 3, we describe the setting of the study, focusing on factors relevant to fertility intentions and behavior. We then (Section 4) outline our theoretical framework and formulate hypotheses regarding the moderating effects of these factors on the association between fertility intentions and behavior in the short term (three years). Section 5 describes the data, measures, and analysis, and Section 6 presents results. We conclude in Section 7.

3. Study setting and design

This study uses data from two waves of a longitudinal survey of married women in rural areas of four contiguous districts of Gaza province in southern Mozambique. The first wave of data collection was carried out in 2006 and the second wave in 2009. The survey is described in more detail in Section 5.

A former Portuguese colony that gained independence in 1975, Mozambique was battered by a civil war for the first decade and a half of its independent existence. Since the end of the war in 1992 and the deployment of economic structural adjustment programs in the early 1990s, the country has experienced a remarkable macroeconomic recovery with an average growth rate of 7% in the first decade of this century. Yet with an average per capita annual

income of $440, life expectancy of 48 years, and adult literacy rate of 54%, Mozambique remains one of the poorest and least economically developed nations in the world (World Bank 2011). Mozambique is also among the world's worst-affected countries by the HIV/AIDS epidemic. Estimates from antenatal surveillance data showed the national prevalence rate among adults aged 15-49 increasing from 8.2% in 1998 to 16.0% in 2007 (Ministry of Health 2008). The latest national estimate, derived from the 2009 National AIDS Survey, is lower, 11.5%, but that survey also points to considerable regional variation. Thus in Gaza province, where our data were collected, estimated prevalence was 25%, the highest of all of Mozambique's provinces (Ministry of Health 2010).

The four districts where the data were collected have a total area of around 5,900 square miles and a population of some 650,000 inhabitants. The population of the districts is predominantly rural, as is the population of Mozambique as a whole (75% in study districts, 70% in Mozambique, according to the 2007 population census) (National Institute of Statistics 2011). These rural areas are, in many respects, typical of Mozambique's countryside. The mainstay of the local economy is subsistence farming, with unstable harvests due to frequent droughts and floods. Fluctuating agricultural yields and scarcity of non-agricultural employment, combined with proximity to South Africa, have produced massive flows of male labor migration to the neighboring country. Although labor migration from southern Mozambique has continued for generations, its nature and outcomes have undergone considerable change in recent times. Historically, migration was a sure source of income for migrants, most of whom were formally recruited to work in the South African mining sector, and for their left-behind families. Today's migration, in contrast, is increasingly informal, and its returns are less predictable (Agadjanian, Yabiku, and Cau 2011; de Vletter 2007).

There is some evidence that fertility transition has begun in Gaza province. According to the 2003 Demographic and Health Survey (DHS), the most recent DHS before the period of our data collection, virtually all women surveyed in Gaza reported knowing at least one modern method of contraception. At the time of the DHS, about 15% of women of reproductive age were using some form of modern contraception, primarily hormonal methods (a considerable increase from the 1.8% reported in the DHS conducted five years earlier), and more than three quarters of non-users reported planning future use. Still, desired family size is high (mean of 4.3 children), and contraception is used largely for spacing at low parities. Birth rates also remain high, with an estimated total fertility rate in Gaza of 5.4 children per woman (National Institute of Statistics and Ministry of Health 2005).

4. Theoretical framework and research hypotheses

For women whose fertility behavior does not conform to their preferences, the range of possible causes for this mismatch is wide and depends on whether women want to have additional children. For women who want to have children, i.e., the majority of married women in pre- and early transitional settings like ours, infertility or marital disruption may prevent the achievement of those goals. In the case of women who want to stop having children – the subject of the analyses in this paper – the proximate determinants of inconsistency are sexual activity without effective contraception. The distal determinants are more complex. Women may not use contraceptives because they do not know about modern methods of family planning, because access is difficult, or because of concerns about side effects. In addition, social pressures may push women to have more children than they might have desired. For instance, husbands or mothers-in-law may persuade women to continue childbearing against their wishes. Furthermore, women may change their fertility preferences – either as a result of changing circumstances, such as new economic conditions or the death of a child, or in response to pressure from family members. Women with

stronger or more persistent fertility preferences may be more likely to translate those desires into behavior.

Factors that moderate the association between preferences and behavior can be classified as those related to the *ability* to control fertility and those reflecting the *motivation* to control fertility. Both of these groups of factors impact fertility through the same behaviors (sex and contraception); the former affect stopping behavior through ease or difficulty of using contraception or avoiding sex, while the latter impact the possibility of overcoming barriers related to these difficulties. The ability to control fertility incorporates knowledge of means of fertility limitation (technological or behavioral); access to contraceptive technology; and the costs of fertility regulation broadly construed to include financial costs, time costs of transport to procure contraception, health costs associated with side effects, and social costs related to possible stigma (Bulatao and Lee 1983). These factors have been explored in a large demographic literature addressing unmet need for and barriers to contraception.

Factors related to motivation have received less attention from demographers. Any woman who reports that she does not want more children could be considered as motivated to limit fertility. However, social psychological theories relating intentions and behavior recognize that desires to limit fertility may coexist with appreciation of possible benefits of childbearing. For example, the theory of planned behavior argues that intentions are the product of both individual attitudes and social norms, which may conflict (Ajzen 1991; Ajzen and Fishbein 1980).[4] Similarly, Miller and colleagues (Miller 1986; Miller, Severy, and Pasta 2004) find that individuals can hold simultaneous positive and negative evaluations of the consequences of having children. According to these frameworks, greater consistency in attitudes (between individual and normative evaluations of a behavior, or between perceptions of positive and negative consequences of the behavior) leads to greater consistency between preferences and behaviors. These theories have largely been applied in developed countries (but see Kodzi, Johnson, and Casterline 2010 for a sub-Saharan application), where birth rates (and normative family sizes) are relatively low and childbearing is understood as primarily a product of individual decision-making. In sub-Saharan Africa, the social importance of having a large family continues to be substantial. Thus, women who would like to stop having children must reconcile their attitudes with a broader social context focused on positive evaluations of fertility. Elements of the social context that reinforce desires to have no more children are likely to increase consistency between desires and behaviors.

Our hypotheses propose possible sources of variation in the ability or motivation to limit fertility. We suggest that factors that increase *either* ability *or* motivation will increase correspondence between fertility preferences and behavior. It is important to note that these hypotheses address the moderating effects of the specified factors on the preference-behavior relationship rather than their direct effects on preferences or behavior. Some of the proposed moderating factors may also have direct effects on desires or behavior; we discuss these associations briefly, but because the primary focus of this analysis is the association between desires and behavior we do not formulate hypotheses for direct effects.

[4]The theory of planned behavior describes associations between intentions and behaviors. Intentions are the product of attitudes and normative evaluations, and the perceived ability to control behavior both shapes intentions and moderates intention-behavior correspondence. Desires are not included in the formal model, but extensions of the theory incorporate desires (e.g., Perugini and Bagozzi 2001). Distinctions between attitudes, desires, and intentions are central to these theories. As noted above, the difficulties of translation and implementation of survey instruments in developing countries pose measurement challenges in making these distinctions in demographic applications. We therefore concentrate our analysis on the structural factors that reduce perceived (and actual) control over childbearing in our high fertility setting, rather than the internal attitudinal dynamics that are the major interest of the theory of planned behavior and its extensions.

4.1 Ability to limit childbearing

As noted in Section 3, the 2003 Mozambique DHS data show that most women are familiar with modern contraception. In our study area, as in the rest of Mozambique, public maternal and child health clinics supply IUDs, hormonal pills, injectable contraceptives, and condoms free of charge. Male condoms are also widely available in markets and pharmacies at nominal prices. Thus, effective birth control is theoretically possible in the area. However, access to contraception may be challenging. Travel to clinics can be difficult in rural Mozambique, especially during the rainy season, and it is expensive both in direct monetary costs and in opportunity costs related to lost time on household or agricultural labor. As a result, poor women and women living far from clinics may not be able to travel to get contraceptives. Previous studies indicate that women living closer to providers of contraception are more likely to use contraceptive methods (Brauner-Otto, Axinn, and Ghimire 2007; Entwisle et al. 1997; Thang and Anh 2002). These women should therefore be more likely to carry out the desire to stop childbearing. Furthermore, financial resources may allow women to travel to clinics, also increasing contraceptive use and consistency between preferences and behavior. Finally, extensive past research has shown that better educated women have higher rates of contraceptive use (e.g., Ainsworth, Beegle, and Nyamete 1996; Castro Martin 1995; United Nations 1987). Better educated women may also have generally higher efficacy in transforming preferences into behavior.

H1: Among women who want to stop having children, women who live closer to health clinics providing family planning services will be less likely to have another child than women who live farther from clinics.

H2: Among women who want to stop having children, women living in wealthier households will be less likely to have another child than women living in less-wealthy households.

H3: Among women who want to stop having children, women with higher levels of education will be less likely to have another child than women with lower levels of education.

4.2 Motivation to stop childbearing

A growing body of research shows that actual or perceived risk of HIV infection influences childbearing desires, intentions, and behavior (e.g., Aka-Dago-Akribi et al. 1999; Baylies 2000; Cooper et al. 2007; Yeatman 2009a, 2009b). Women who believe they are HIV positive or may become HIV positive in the future may want to limit childbearing because of concerns about their own health and their children's health and well-being. Furthermore, high levels of adult AIDS mortality may result in burdens of care for orphans and sick relatives that influence demand for children even among women who are convinced they are and will remain seronegative. In addition to effects on the direction of fertility preferences, these factors may increase the *strength* of motivation to stop having children. As a result, women who want to avoid childbearing because of fears about HIV may be more likely to carry out their desires than other women with similar fertility preferences. We use both individual and community-level measures to index the impact of the HIV/AIDS epidemic on fertility. Measures are described more fully in Section 5.1.

H4: Among women who want to stop having children, women with a higher level of worry about HIV will be less likely to have another child than women with a lower level of worry.

H5: Among women who want to stop having children, women living in areas with high AIDS mortality will be less likely to have another child than women living in areas with low AIDS mortality.

As we noted in Section 3, male labor out-migration has been an important feature of community and household life in southern Mozambique. The transformation of the migration regime in the southern African region in general and in Mozambique in particular has increased the variation in the economic and social outcomes of migration. Some migrants are able to find jobs, maintain family ties, and send remittances home. Other migrants have difficulty with one or more of these components of "successful" migration. The wives of migrants who do not send remittances experience a double instability: both lack of economic support and uncertainty regarding the future of the relationship with the husband. This instability may translate into strong motivation to avoid childbearing.[5]

H6: Among women who want to stop having children, women married to unsuccessful migrants will be less likely to have another child than women married to successful migrants or to non-migrants.

5. Data and methods

The sample for the 2006 survey was drawn from the population of married women aged 18-40 residing in 56 villages in rural areas of the four contiguous districts included in the study. In each district, 14 villages were selected with probability proportional to size. In each selected village (or randomly selected section thereof if a village was large), all households with at least one married woman were canvassed and divided into two groups, those with at least one woman married to a migrant and those with no such women. These two groups were used as separate sampling frames: Fifteen households were randomly selected from each of them. Sampling weights were created to account for the different probability of selection for migrant and non-migrant households. In each selected household a woman was interviewed (in households classified as migrant, a woman married to a migrant was interviewed). The resulting sample consisted of 1678 women, more or less evenly split between women married to migrants and women married to non-migrants. In 2009, a second wave of data collection was carried out among women still living within the study area. After the main survey data collection was finished, follow-up data collection took place later in the year in an attempt to locate women who were unavailable during the first attempt. A total of 1310 women, or 78% of the original 2006 sample, were located and re-interviewed. This level of retention is comparable to other longitudinal surveys in sub-Saharan Africa (Thornton 2008). Most of the women lost to follow up either traveled to South Africa to rejoin their migrant husbands or were divorced or separated and moved out of their husband's home. The longitudinal sample is therefore not representative of the whole population of women of reproductive age, but rather of the group of women who remained in the same village between 2006 and 2009, and results are generalizable to residentially stable women. Because most childbearing takes place within marriage and marital dissolution usually causes major disruption in fertility, we exclude from the sample women who were located but had separated from their husbands or whose husbands had died after 2006, even if they remarried (an additional 143 women, bringing the sample to 1167 women). After excluding cases with missing data on the independent variables (n=3), the analytic sample included 1164 women.

In both 2006 and 2009, the survey collected detailed demographic and socioeconomic information including pregnancy histories, reproductive intentions, husband's migration history, and household material status as well as information on HIV/AIDS awareness and

[5]Previous research using these data has found that men's migration increases women's autonomy, and that this increase is larger for wives of unsuccessful migrants (Yabiku, Agadjanian, and Sevoyan 2010). Greater autonomy, in turn, may improve ability to carry out preferences to stop childbearing or compensate for constraints imposed by economic instability in these households. Thus, husband's migration experience may influence ability as well as motivation to implement fertility preferences.

prevention, women's social networks, and their gender attitudes. In parallel with the women's survey, a community survey was carried out in each of the villages included in the sample. The community survey focused on village economic and social life, out-migration, and HIV/AIDS issues. In addition, all maternal and child health clinics in the four districts of the study area were surveyed about the administrative structure of the clinic and services provided.

5.1 Measures

The dependent variable for the analysis is whether the woman had a child between the date of the interview in 2006 and the second survey in 2009. For women who were pregnant at the time of the interview in 2006, births resulting from that pregnancy are not included in the dependent variable. Thus, the outcome for women pregnant at the time of interview in 2006 is whether they had a birth after the one resulting from that pregnancy.

The primary independent variable is whether the woman reported in 2006 that she did not want to have a(nother) child. Specifically, the survey asked women, "Would you like to have (more) children in the future, even if it is not right away?" (That is, the survey asked about positive intentions for more children.) Women who were pregnant at the time of the survey in 2006 were asked about the desire for more children after the birth of the child they were carrying. Response options were yes, no, and don't know. Women who responded "no" were considered not to want more children. The measure used here does not specify desired fertility timing. The survey contained a follow-up question asking about fertility timing; in exploratory analysis, we found that incorporating measures of desired timing did not improve the explanatory power of desires, perhaps because the timing question asked about a two-year period while our period of observation was three years long.

Other key independent variables include concern about HIV, husband's migration status, household wealth, education, and distance to the nearest clinic providing family planning services. We also control for basic sociodemographic characteristics (age, number of living children, time elapsed since most recent birth before 2006, whether the respondent is in a polygamous marriage, whether bridewealth was paid when the respondent married, religion) to account for possible confounding between preferences and behavior. Fertility behavior prior to the 2006 survey reflects earlier fertility desires. If desires measured in 2006 are correlated with these earlier fertility goals, including measures of prior fertility behavior may confound estimates of the association between desires in 2006 and future behavior. We tested models excluding fertility behavior prior to 2006 and found little substantive change in results.

Distance to the nearest clinic providing family planning services was calculated based on data from the survey of clinics and from the individual survey; in both components, latitude and longitude coordinates of the location were recorded. We treat distance as a continuous variable. We tested models using alternative specifications for distance (quadratic, log, categorical), but found no substantive change in results or improvement in model fit and so prefer the simpler specification. Household wealth is notoriously difficult to measure in developing countries. We measure wealth using a four-point scale based on ownership of durable goods (radio, television, bicycle, car or motorcycle), which captures long-term access to economic resources at the household level. Respondents are assigned a value of 1 on the scale if their household has none of the goods; a value of 2 if the household has a radio only; a value of 3 if the household has a radio and a bicycle; and a value of 4 if the household has a car or motorcycle. The scale was constructed based on the distribution of durable goods among survey households, exploratory analysis, and ethnographic observation in the study area. We tested alternative measures of household wealth including ownership of cattle (a traditional marker of wealth) and the material that the house is made of; we also

tested models using index scores as categorical variables. The continuous specification of the possession index was found to best capture the association with fertility. Education is divided into three categories: no formal schooling, elementary school (1-4 years of formal schooling), and more than elementary school (5 years or more of formal schooling).

We include two measures to capture the possible impact of the HIV/AIDS epidemic on fertility. To measure subjective individual risk, we assess how worried the respondent is about contracting HIV. This measure is constructed based on responses to two questions: "Are you very worried, a little worried, or not worried at all about the possibility of contracting the AIDS virus from your husband?" and a similar question asking about contracting the virus from another man. The primary division in responses is between women who were very worried and women who were not worried: few women (less than 5% of the sample) answered "a little worried" to these questions. The variables were therefore combined into a single dichotomous measure, with women who answered "very worried" to either of those questions assigned a value of 1 and all other women assigned a value of 0. The questions ask specifically about concern regarding sexual transmission. Since sexual transmission is the primary source of HIV infection in the region, they reflect women's assessment of individual risk based on their perception of their husband's/ extramarital partner's sexual networks and their degree of control over his sexual behavior. These sexual networks need not be exclusively local. Migrant husbands may have extramarital sexual partners in the migration destination, and non-migrant husbands may have migrated in the past or may travel within the region (e.g., to markets or regional commercial areas).

We also use reports from the community survey to classify villages as "high" or "low" AIDS mortality villages. In each sampled village, a village leader (traditional authority, community leader, health worker, religious leader, etc.) was asked about conditions in the community, including the number of adults who died of AIDS or a disease that appeared to be AIDS in the past year. These reports are used to classify villages into high and low mortality villages based on the median number of deaths reported (five deaths in the past year). Although subject to misreporting, these reports reflect the degree to which AIDS is a visible cause of mortality in the community and thus the extent to which concern about HIV may play a role in women's reproductive decision-making. Because it captures community rather than individual conditions, this measure assesses the impact of factors such as predicted burden of caring for individuals with the disease or AIDS orphans. It may also be a proxy for the effects of AIDS mortality on local economic conditions.

To capture variation in husband's migration experience, we classify husbands who were migrants in 2006 as "successful" or "unsuccessful" migrants. This measure is based on their wife's response to a question about whether the household is better off or worse off since the husband migrated: husbands who have improved the household's well-being are categorized as successful. This subjective measure of migration success describes wives' perception of husbands' experiences.

5.2 Analytic approach

We use logistic regression to assess the association between predictors measured in 2006 and the probability of having a live birth between 2006 and 2009. Given the approach used in building the survey sample, models and descriptive statistics are weighted to adjust for differential probability of selection among migrants' wives and non-migrants' wives. Models are estimated using SAS; PROC SURVEYLOGISTIC is used to correct standard errors to account for the two-stage sample design. In exploratory analysis, we estimated multilevel models to examine the possibility that unobserved village-level characteristics influence fertility behavior, but those models did not show village-level variance beyond

that explained by the variables included in the model. We therefore present the simpler single-level models; results from multilevel models are available on request.

We test hypotheses regarding moderators of the intention-behavior association by adding interactions to models predicting childbearing based on the desire to stop childbearing and sociodemographic characteristics. Hypotheses are evaluated based on the statistical significance of both coefficients for interaction terms and improvements in model fit. For ease of interpretation, we estimate models testing each interaction term singly; a model with all interaction terms included provides substantively similar results (results available from the authors upon request).

Our models assume that the effect of fertility preferences on behavior is independent of the determinants of preferences (net of other variables included in the model). If there are unobserved factors that are associated both with wanting to stop childbearing and with implementing those desires – plausible candidates might include self-efficacy, planfulness, or "modernity" – our results will be biased. To assess the impact of selection into wanting to stop childbearing on our results, we applied Heckman two-stage selection models using maximum likelihood estimators (*heckprob* in Stata). Results showed that the unmeasured determinants of preferences were not significantly associated with the unmeasured determinants of behavior; associations between measured variables and behavior were not substantively different from models assuming independence. We also used probit models to calculate a propensity score for wanting to stop childbearing and included this score in models predicting behavior. The propensity score did not significantly predict fertility behavior, and including the score did not change other coefficients. We conclude that implementing preferences can be plausibly treated as independent of forming preferences and present results from independent models. Results from the selection and propensity score models are available on request.

6. Results

6.1 Descriptive results

Table 1 describes bivariate associations between characteristics measured in 2006, wanting no more children, and childbearing behavior between 2006 and 2009. The first column in Table 1 shows the percent of women who report wanting no more children in 2006, the second shows the percent of women who have a child between 2006 and 2009, and the third and fourth columns show the percent of women who have another child according to whether they want to stop childbearing (column 3) or not (column 4). Thus, lower percentages in the third column (and higher percentages in the fourth column) represent greater consistency between preferences and behavior. Overall, inconsistency for women who want to stop is relatively high in this population; 56.4% of women who wanted no more children in 2006 have a child by 2009. Consistency between preferences and behavior is slightly higher for women who do not want to stop childbearing – 69.4% of whom have a child by 2009 – than for women who want to stop. These estimates represent short-term behavior and do not include women who may have a child after 2009. Long-term inconsistency is likely higher for women who do not want a child and lower for women who do.

We focus discussion on characteristics hypothesized to moderate the association between negative fertility preferences and behavior. Household wealth and the distance between a woman's residence and the nearest family planning clinic are hypothesized to increase the consistency between wanting no more children and behavior by improving women's access to contraception. These factors are not strongly associated with wanting no more children. There is little pattern to the relationship between these factors and fertility in general, but the

association is stronger among women who do not want more children than among those who do want more. Education is not strongly correlated with the desire to have children, and the existing association is U-shaped, with women with intermediate levels of education more likely to want no more children (31.2%) than either the most educated (22.4%) or the least educated women (24.8%). The association between education and childbearing is in the expected direction, with the least educated women most likely to have a child between 2006 and 2009 (68.5% vs. 66.1% vs. 63.3%), but differences are small. Looking at the third column, childbearing among women who want to stop, the relationship with education strengthens. Behavior was inconsistent with preferences to stop for 65.7% of women with no formal education compared to 49.5% of women with 5 or more years of education.

Other factors are, for the most part, only weakly associated with wanting to stop childbearing. Women who are very worried about HIV are slightly more likely to want no more children than women who are not very worried (27.7% vs. 23.9%). In addition, women married to non-migrants are more likely to want to stop childbearing in 2006 than other women (31.8% vs. 20.3% and 20.7% for wives of successful and unsuccessful migrants, respectively). Overall, though, there are not large differences in preferences across these factors. Differences in fertility behavior are also small. The third column shows consistency between preferences and behavior. Here, differences across migration and concern about HIV are larger, consistent with moderating effects of these factors. Among women who want no more children, women who live in high AIDS mortality villages are less likely to have a child than women living in low mortality villages (52.2% vs. 60.5%), and wives of unsuccessful migrants have lower birth rates than wives of either non-migrants or successful migrants (40.8% vs. 58.0% and 62.9%). Differences related to worry about HIV are in the opposite direction as predicted by Hypothesis 4 – women who are very worried are less likely to implement preferences to stop childbearing than women who are not worried.

6.2 Multivariate results

For the multivariate analyses, we first present results showing the factors associated with wanting to stop childbearing (Table 2). Results from a logistic regression model predicting negative preferences are largely consistent with the bivariate associations shown in Table 1. Women who had more children in 2009 were more likely to want no more children. Polygamously married women also had more negative fertility preferences; it is possible that husbands take second wives in response to their first wives' desire to stop having children, or that the presence of a co-wife makes it possible for polygamous respondents to limit fertility. Relative to women married to successful migrants, women whose husbands were not migrants were more likely to want to stop childbearing. Other individual and community characteristics are not related to the desire to limit family size.

Results of logistic regression models predicting childbearing between 2006 and 2009 are shown in Tables 3 and 4. Table 3 includes three models: Model 1, which includes only the desire to stop childbearing; Model 2, which adds sociodemographic controls; and Model 3, which includes only control variables. Hypotheses regarding moderating effects are tested in the models shown in Table 4. Coefficients for sociodemographic controls are essentially unchanged relative to the models in Table 3. To conserve space, these coefficients are not displayed in Table 4.

Model 1 in Table 3 illustrates the unconditional association between the desire to stop having children and fertility. As expected, negative preferences are strongly and negatively associated with having a child between 2006 and 2009. Model 2 shows the associations between wanting no more children and behavior, taking sociodemographic characteristics into account. The association between preferences and behavior is robust to controls – in fact, it is stronger in Model 2 than in the unconditional model (b=−0.87 vs. b=−0.56 in

Model 1). Consistent with previous research, age and education are also negatively associated with childbearing, net of preferences. Somewhat surprisingly, although consistent with bivariate statistics, parity was positively associated with having another child (b=0.35). In additional analyses (not shown), we tested categorical and curvilinear specifications of the relationship between parity in 2006 and subsequent childbearing. We found this positive relationship in all specifications. Similarly, recent fertility (as of 2006) is positively associated with fertility between 2006 and 2009. In this context, where little fertility control is practiced, past fertility behavior may reflect biological capacity for childbearing. Exploratory analyses showed that the relationship between parity, preferences, and behavior explains the increase in the magnitude of the coefficient for preferences across models. Women who have more children are more likely to want to stop but also more likely to have a child; not controlling for parity suppresses some of the association between preferences and behavior. The coefficient for preferences was statistically significant in specifications without parity, and conclusions regarding moderating variables were the same in models without parity. Other measures, including worry about HIV, local AIDS mortality, household wealth, and distance to the nearest clinic providing contraception, are not significantly associated with childbearing when preferences are taken into account.

For comparison, Model 3 shows the relationship between sociodemographic characteristics and fertility without controlling for preferences. For the most part, results from Models 2 and 3 are similar. Statistical significance levels do not change, and the magnitude of coefficients changes only minimally; there is little evidence that the associations between sociodemographic characteristics and fertility behavior are moderated by preferences. This finding is perhaps to be expected, since Table 2 showed that few sociodemographic characteristics are significant predictors of fertility preferences.

Models 1 through 6 in Table 4 test Hypotheses 1 through 6, respectively, by including corresponding interaction terms. Results from Model 1 show that, contrary to Hypothesis 1, living closer to a clinic that provides family planning services does not moderate the link between preferences and behavior. The average distance to a clinic in the analytic sample is 5.6 km, and 90% of women live within 10 km of a clinic. It may be that within this range, there is little impact of distance on women's ability to procure contraceptives. In contrast, Hypothesis 2, regarding the moderating power of household wealth, is supported (Model 2). The negative association between wanting to stop childbearing and fertility is stronger for women living in wealthier households. Coefficients for interactions between education and wanting no more children are not statistically significant and do not significantly improve model fit (Table 4, Model 3 vs. Table 3, Model 2). However, the interaction terms are negative in sign, as predicted by Hypothesis 3, and are relatively large in magnitude. Moreover, adding interactions between preferences and education reduces the main effect of preferences to non-significance, suggesting that wanting to stop childbearing affects behavior primarily among women with some schooling. In exploratory analyses (not shown), we tested interactions between wanting to stop childbearing and a collapsed dummy variable for education (any education vs. no education). Interactions between "any education" and fertility preferences were marginally statistically significant ($p<.10$) and show that the effects of fertility preferences on stopping behavior are stronger for women with any amount of education than women without formal schooling.

Contrary to the predictions of Hypothesis 4, the interaction between worry and wanting no more children is not statistically significant and does not significantly improve model fit, indicating that the association between preferences and behaviors is the same regardless of women's worry about HIV. This coefficient is also positive, contrary to the hypothesized sign. However, this association does vary according to local AIDS mortality. In Model 5, the interaction between preferences and local mortality is statistically significant ($p<.05$) and

negative. That is, living in a village with relatively high AIDS mortality reduces the likelihood of having a child for women who want no more children. The main effect for AIDS mortality is positive, but small and not statistically different from zero (b=.13). Thus, the negative association between local AIDS mortality and childbearing exists only for women who want to stop childbearing, suggesting that this association does not stem from epidemiological mechanisms – women living in a high-AIDS-mortality village may be more likely to be HIV positive – but rather volitional mechanisms as proposed in Hypothesis 5. According to these results, local conditions have more influence than individual risk assessment on consistency between desires and behavior. Because our measure of individual risk is based on sexual transmission, it may also be capturing women's perceived control over their or their husband's sexual behavior. The positive (but non-significant) interaction may reflect a lower ability to negotiate over sexual or contraceptive behavior among women who are very worried about the sexual transmission of HIV.

Model 6 tests Hypothesis 6, which proposed a moderating effect of men's migration on the association between women's desire to have more children and their fertility behavior. The omitted category here is successful migrants, and the model compares the effects of preferences among wives of these men relative to wives of non-migrants and wives of unsuccessful migrants. The interaction between wanting no more children and being married to an unsuccessful migrant is negative and statistically significant, indicating that the effect of preferences on behavior does vary depending on husband's migration status. As predicted by Hypothesis 6, wives of unsuccessful migrants are more likely than women married to non-migrants or successful migrants to carry out the desire to stop childbearing.

7. Discussion and conclusions

Consistent with previous research, our analysis found that fertility preferences have predictive power to explain fertility behavior beyond the variance explained by sociodemographic characteristics. Moving beyond previous research, results also showed that this predictive power is contingent on at least some of these characteristics. Women living in wealthier households are more likely to implement a desire to stop childbearing than poorer women. In addition, women living in villages with high HIV mortality experience greater consistency between preferences and behavior, as do women married to men who are unsuccessful labor migrants.

Overall, these results demonstrate that individual and community characteristics moderate the correspondence between preferences and behavior for women who want to stop childbearing. They also show that preferences moderate the associations between these characteristics and behavior. All of the statistically significant interaction terms (as well as interactions that did not reach conventional levels of statistical significance in these specifications, such as the education interaction) indicate that the relationship between sociodemographic characteristics and behavior is stronger among women who want to stop childbearing than among women who want more children. In fact, when we estimated models separately according to fertility preferences, we found that only age and past fertility behavior – factors associated primarily with the biological capacity to have children – are significantly associated with fertility behavior among women who want more children. (Results from these models are not shown, but are available from the authors on request.) Other sociodemographic differences are associated with differential fertility only among women who express a desire to stop childbearing. Thus, although preferences do not mediate other relationships, they are central to understanding why individual and community characteristics are associated with fertility.

Like most other longitudinal analyses of consistency between preferences and behavior, we do not have precise measures of contraceptive use or sexual frequency over the time period described in this analysis. Detailed longitudinal data on the proximate determinants of fertility (sexual frequency, breastfeeding, contraceptive use) are difficult to collect accurately even in developed country settings. In developing country settings, where calendar dates are less salient, retrospective data are even more difficult to record. This limitation constrains our ability to explore mechanisms through which individual and community characteristics affect fertility behavior. However, even if we could identify all the proximate determinants of fertility among women who want no more children, further information would be necessary in order to pinpoint the ultimate causes. That is, knowing that a woman conceived while not using contraception does not tell us whether she was not contracepting because she could not afford travel to a clinic, because the clinic was out of contraceptives when she visited it, because she feared the side effects of hormonal contraception, because her husband opposed family planning, or perhaps because she had mixed feelings about future childbearing.

In countries with high birth rates, much previous research has focused on access to and knowledge of contraception as barriers to fulfilling preferences among women who want no more children. These factors can be classified as related to the ability to control fertility. Some of the moderating factors we study here – notably household wealth – likely work through improving the ability to implement preferences, including improved access to contraception. However, we also find support for hypotheses about factors related to the motivation to limit fertility, such as village AIDS mortality and husband's migration. The mechanisms through which these factors affect preference-behavior consistency are unclear. It is possible that women married to unsuccessful migrants may have less contact with their husband and therefore less exposure to risk of conception. However, being married to an unsuccessful migrant does not have direct effects on fertility behavior: it is associated with childbearing only for women who report wanting no more children. Similarly, there is no direct effect of community AIDS mortality level on childbearing. The lack of direct effects suggests that these factors affect fertility through volitional means and not purely through (unconscious) biological proximate determinants. Our analysis thus points to the importance of understanding variation in motivation, even among women who want to stop childbearing, in addition to practical barriers to using contraception.

Research in developed countries has argued that women with stronger or more consistent negative fertility preferences are more likely to overcome barriers to effective birth control such as the costs of contraception, inconvenience of access to health services, or resistance from family members (Miller 1986; Musick et al. 2009). Direct measures of the strength or consistency of fertility desires are not available in the data used in this article, and these types of measures have rarely been analyzed in research on high-fertility context. However, results from this analysis suggest that these elements of preferences may play an important role in determining whether fertility desires are translated into behavior. In order to fully understand the role of preferences in predicting fertility behavior in early-transition contexts, more information about the strength, consistency, persistence, and dimension of desires is required.

Our analysis using data from Mozambique adds to and extends a relatively small body of work examining the consistency between childbearing preferences and behaviors in sub-Saharan Africa (Bankole 1995; Kodzi, Johnson, and Casterline 2010). Birth rates in the region are among the highest in the world, and fertility transition in rural Mozambique, as in much of rural Africa, has only barely begun. Fertility decline is a social change that takes place gradually, with some segments of society experiencing change more rapidly than others. The broad range of the moderating factors identified by our analysis illustrates the

need for a more comprehensive and nuanced understanding of fertility changes currently ongoing in sub-Saharan Africa.

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Table 1

Characteristics associated with fertility preferences and behavior, 2006-2009

		Percent of women who:			
		Want to stop	Have another child among:		
	N		All women	Women who want to stop	Women who do not want to stop
All women	1164	27.0	65.9	56.4	69.4
Potential moderators of the association between preferences and behavior					
<1.4 km to nearest clinic	287	26.4	64.8	52.3	69.3
Between 1.4 and 8.1 km to nearest clinic	586	25.5	66.5	58.2	69.3
>8.1 km to nearest clinic	291	30.9	65.6	56.4	69.7
Household wealth index=1	373	28.2	69.7	67.8	70.5
Household wealth index=2	378	29.2	62.6	54.1	66.0
Household wealth index=3	311	23.9	66.3	46.8	72.4
Household wealth index=4	102	23.4	63.4	45.3	68.9
No formal education	307	24.8	68.5	65.7	69.4
1-4 years education	530	31.2	66.1	55.4	71.0
5 or more years of education	327	22.4	63.3	49.5	67.3
Not very worried about HIV	227	23.9	64.3	44.4	70.5
Very worried about HIV	937	27.7	66.3	58.9	69.1
Low AIDS mortality village	573	26.9	66.8	60.5	69.1
High AIDS mortality village	591	27.0	65.0	52.2	69.7
Husband not a migrant	701	31.8	67.5	58.0	71.9
Husband successful migrant	249	20.3	67.0	62.9	68.0
Husband unsuccessful migrant	214	20.7	59.8	40.8	64.7
Other sociodemographic controls					
Age 20 and under	159	9.2	74.2	55.1	76.1
Age 21-25	312	14.0	69.6	57.6	71.5
Age 26-30	333	25.0	72.4	71.6	72.7
Age 31+	360	48.7	52.7	48.8	56.4

		Percent of women who:			
		Want to stop	Have another child among:		
	N		All women	Women who want to stop	Women who do not want to stop
No living children	134	7.4	54.3	35.5	55.8
1 living child	230	9.4	65.5	46.9	67.5
2 living children	278	13.9	68.7	46.9	72.2
3 living children	229	26.8	69.4	59.5	73.0
4 or more living children	293	63.0	65.9	59.6	76.6
Last birth more than one year ago	687	25.4	59.0	46.2	63.3
Last birth within past year	477	29.2	75.6	68.9	78.4
Monogamous marriage	936	24.4	68.4	61.2	70.7
Polygamous marriage	228	38.4	54.9	42.7	62.6
No bridewealth paid	672	22.5	66.8	60.4	68.7
Bridewealth paid	492	33.2	64.6	52.6	70.6
No religion	162	24.5	70.2	66.0	71.6
Mainline Protestant/Catholic	332	31.6	62.4	46.3	69.8
Zionist and other churches	670	25.2	66.7	60.7	68.7

Data: Survey of currently married women in rural Gaza province, Mozambique, 2006 and 2009; see text for details. All percents weighted.

Table 2

Logistic regression of wanting to stop childbearing on individual and community characteristics (N=1164)

	b	SE
Intercept	−4.04	0.61 ***
Predictors		
Distance to nearest clinic	0.01	0.02
Household wealth index	−0.06	0.09
No formal education (reference)		
1-4 years of education	0.19	0.24
5+ years of education	0.31	0.31
Very worried about HIV	0.15	0.18
Lives in high AIDS mortality village	0.01	0.16
Husband successful migrant (reference)		
Husband not a migrant	0.52	0.29 +
Husband unsuccessful migrant	0.33	0.31
Sociodemographic controls		
Age 20 and under (reference)		
Age 21-25	−0.07	0.34
Age 26-30	−0.03	0.36
Age 31+	0.32	0.42
Number of living children (2006)	0.67	0.08 ***
Last birth within past year (2006)	0.22	0.18
Polygamous marriage	0.50	0.19 **
Bridewealth paid	0.26	0.19
No religion (reference)		
Mainline Protestant/Catholic	0.37	0.34
Zionist/other religion	0.18	0.28
−2 log likelihood	1076	

Data: Survey of currently married women in rural Gaza province, Mozambique, 2006 and 2009; see text for details. All models are weighted and account for complex survey design.

+ : p<.1

* : p<.05

** : p<.01

*** :p<.001.

Table 3

Logistic regression of having a birth between 2006 and 2009 on fertility preferences and sociodemographic characteristics (N=1164)

	Model 1		Model 2		Model 3	
	b	SE	b	SE	b	SE
Intercept	0.82	0.08 ***	0.91	0.54		
Wants no more children	−0.56	0.15 ***	−0.87	0.20 ***		
Potential moderators						
Distance to nearest clinic			0.01	0.02	0.01	0.02
Household wealth index			−0.09	0.08	−0.07	0.08
No formal education (reference)						
1-4 years of education			−0.03	0.18	−0.06	0.17
5+ years of education			−0.29	0.17 +	−0.32	0.17 +
Very worried about HIV			0.22	0.16	0.21	0.15
Lives in high AIDS mortality village			−0.06	0.15	−0.07	0.15
Husband successful migrant (reference)						
Husband not a migrant			0.19	0.21	0.12	0.20
Husband unsuccessful migrant			−0.27	0.22	−0.29	0.21
Sociodemographic controls (measured in 2006)						
Age 20 and under (reference)						
Age 21-25			−0.54	0.23 *	−0.49	0.23 *
Age 26-30			−0.68	0.25 **	−0.61	0.24 *
Age 31+			−1.79	0.28 ***	−1.78	0.28 ***
Number of living children			0.35	0.05 ***	0.24	0.04 ***
Last birth within past year			0.65	0.14 ***	0.61	0.14 ***
Polygamous marriage			−0.36	0.16 *	−0.42	0.16 **
Bridewealth paid			0.20	0.17	0.17	0.17
No religion (reference)						
Mainline Protestant/Catholic			−0.27	0.24	−0.31	0.24
Zionist/other religion			−0.17	0.22	−0.17	0.20
−2 log likelihood	1476		1348		1374	

Data: Survey of currently married women in rural Gaza province, Mozambique, 2006 and 2009; see text for details. All models are weighted and account for complex survey design.

+ : p<.1

* : p<.05

** : p<.01

*** :p<.001.

Table 4

Logistic regression of having a birth between 2006 and 2009 on fertility preferences and sociodemographic characteristics, with interactions (N=1164)

	Model 1		Model 2		Model 3	
	b	**SE**	**b**	**SE**	**b**	**SE**
Intercept	0.94	0.55	0.64	0.52	0.77	0.55
Wants no more children	−1.00	0.23 ***	0.00	0.45	−0.45	0.33
Potential moderators						
Distance to nearest clinic	0.00	0.02	0.01	0.02	0.01	0.02
Household wealth index	−0.08	0.08	0.03	0.10	−0.08	0.08
No formal education (reference)						
1-4 years of education	−0.03	0.18	−0.02	0.18	0.11	0.20
5+ years of education	−0.29	0.17	−0.28	0.17	−0.13	0.18
Very worried about HIV	0.22	0.16	0.20	0.16	0.22	0.16
Lives in high AIDS mortality village	−0.07	0.15	−0.06	0.16	−0.07	0.16
Husband successful migrant (reference)						
Husband not a migrant	0.18	0.21	0.18	0.21	0.19	0.21
Husband unsuccessful migrant	−0.27	0.22	−0.26	0.22	−0.26	0.22
Interactions: Wants no more children						
Distance to nearest clinic	0.03	0.03				
Household wealth index			−0.42	0.21 *		
1-4 years of education					−0.51	0.36
5+ years of education					−0.60	0.45
Very worried about HIV						
High AIDS mortality villages						
Husband not a migrant						
Husband unsuccessful migrant						
−2 Log likelihood	1347		1341		1345	
Intercept	1.02	0.54 +	0.80	0.54	0.77	0.55
Wants no more children	−1.23	0.36 ***	−0.55	0.28 *	−0.33	0.35

	Model 1		Model 2		Model 3	
	b	**SE**	**b**	**SE**	**b**	**SE**
Potential moderators						
Distance to nearest clinic	0.01	0.02	0.01	0.02	0.01	0.02
Household wealth index	−0.08	0.08	−0.09	0.08	−0.09	0.08
No formal education (reference)						
1-4 years of education	−0.04	0.18	−0.04	0.18	−0.04	0.18
5+ years of education	−0.29	0.17	−0.28	0.17	−0.29	0.17
Very worried about HIV	0.10	0.17	0.23	0.15	0.23	0.16
Lives in high AIDS mortality village	−0.07	0.15	0.13	0.19	−0.04	0.16
Husband successful migrant (reference)						
Husband not a migrant	0.19	0.21	0.22	0.21	0.32	0.26
Husband unsuccessful migrant	−0.27	0.22	−0.24	0.22	−0.05	0.26
Interactions: Wants no more children						
Distance to nearest clinic						
Household wealth index						
1-4 years of education						
5+ years of education						
Very worried about HIV	0.45	0.35				
High AIDS mortality villages			−0.64	0.32 *		
Husband not a migrant					−0.59	0.44
Husband unsuccessful migrant					−0.99	0.53 +
−2 Log likelihood	1346		1343		1344	

Data: Survey of currently married women in rural Gaza province, Mozambique, 2006 and 2009; see text for details. All models are weighted and account for complex survey design. All models include sociodemographic controls as shown in Table 3.

+: p<.1

*: p<.05

**: p<.01

***:p<.001.

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