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The Illusion of Stable Fertility Preferences

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Abstract

Fertility preferences have long played a key role in models of fertility differentials and change. We examine the stability of preferences over time using rich panel data on Kenyan women's fertility desires, expectations, actual fertility and recall of desires in three waves over nine years, when respondents were in their twenties. We find that although desired fertility is quite unstable, most women perceive their desires to be stable. Under hypothetical future scenarios, few expect their desired fertility to increase over time, but in fact increases in fertility desires are common. Moreover, when asked to recall past desires, most respondents report previously wanting exactly as many children as they desire today. These patterns of bias are consistent with the emerging view that fertility desires are contextual, emotionally laden, and structured by identity.

Keywords

Stability of preferences; fertility preferences; panel data; Kenya

JEL Codes:

D83; D84; D91; J13; J12; I12; O12

Introduction

One of the most central and persistent questions in population science concerns when, how, and why fertility changes (Davis and Blake (1956); Coale (1973); Lee (1980); Caldwell,

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Orubuloye and Caldwell (1992)). While contemporary research on rich countries focuses largely on below-replacement fertility (Morgan and Taylor (2006); Balbo, Billari and Mills (2013)), persistently high fertility in Sub-Saharan Africa also remains a central topic of scholarship (Shapiro and Gebreselassie (2008); Moultrie, Sayi and Timæus (2012)). The literatures on below replacement fertility in rich countries and persistently high fertility in much of Sub-Saharan Africa are connected through a focus on reproductive preferences as pivotal to explaining change and variation in reproductive rates. Some scholars consider reproductive intentions to be the product of rational choice, a utility maximization calculation subject to a budget constraint (Schultz (1997); Becker (2009)); others argue that intentions are instead the product of social norms and cultural values, which can diffuse within and potentially across communities (Watkins (1999, 2000); Casterline (2001)). The debate between these two positions has long been heated (see discussions in Alter (1992); Pollak and Watkins (1993); Hirschman (1994); Mason (1997)). However, the disagreement hides a more fundamental consensus: in both approaches, individual preferences are treated as the link between demographic outcomes and social, economic, and cultural forces. Understanding fertility differences and change, therefore, requires understanding changing fertility preferences.

For this reason, reproductive preferences have been a vibrant object of research over the past two decades (Agadianian (2005); Johnson-Hanks (2005, 2007); Hayford and Morgan (2008); Rossier and Bernardi (2009); Iacovou and Tavares (2011); Trinitapoli and Yeatman (2011); Sennott and Yeatman (2012); Bachrach and Morgan (2013); Miller, Barber and Gatny (2013); Hartnett (2014); Testa and Basten (2014); Günther and Harttgen (2016); Marteleto et al. (2017); Hanappi et al. (2017); Bhrolcháin and Beaujouan (2019)). In partial contrast to earlier literatures that assumed the centrality of fertility preferences as a key mechanism for fertility difference and change, this recent literature asks fundamental questions about reproductive preferences themselves: How are fertility preferences formed? When and how do they change? And to what degree do they actually predict behavior? When and when not? Building on and adding to this important body of work, this paper presents descriptive evidence from the Kenyan Life Panel Survey (KLPS), a rich, longitudinal dataset with detailed educational, labor market, health, nutritional, demographic, and cognitive information tracking over 7,500 individuals as they grew from children into young adults from 1998 until 2014. For the purpose of this paper, we make use of a sub-sample of 351 older girls with detailed information on reproductive preferences in three survey waves over 9 years starting in 2003-2005, when most of the girls were 17 to 22 years old.

The KLPS data offers an excellent opportunity to understand the evolution of reproductive desires of young adult women in a low-income country. We show that fertility desires change considerably as teens enter early adulthood, but that the respondents perceive their desires as stable, both in anticipation and in their memory. We find further that respondents underestimate how much their desires will change in the future, and that they especially underestimate increases in their desired fertility. Interestingly, they also underestimate how much their desires have changed in the past, again particularly underestimating past increases in their fertility desires. These findings suggest that prospection biases, already well documented in consumer behavior, and retrospection biases also apply to high stakes

fertility preferences. As such, we also add to the growing literature in Demography that examines these biases – in particular in retrospectives measures – in more detail (Bankole and Westoff (1998), Koenig et al. (2006), Jain et al. (2014), Smith-Greenaway and Sennott (2016), Trinitapoli and Yeatman (2018); Cleland, Machiyama and Casterline (2020)) for a brief review). Finally, we find that desired and expected fertility are associated with subsequent fertility behavior, again asymmetrically; in this context, individuals' expectations to bear children within a certain timeframe (of 5 years) are more often fulfilled than expectations to avoid childbearing.

Taken together, the results support the emerging consensus in population science that fertility preferences are “constructed” over time (in the terms of Bhrolcháin and Beaujouan (2019)), as much a response to reproductive outcomes as their cause. Reproductive outcomes, therefore, are significantly shaped by context.

1 Literature Review

Westoff and Ryder (1977) conducted perhaps the first study of the predictive power of reproductive intentions, initially hoping to improve demographic forecasting. This seminal paper used data from white American women, in the first 20 years of their first marriages, interviewed in 1970 and 1975. They found that 34% of women who had said that they wanted another child had not borne one in the intervening five years, while 12% of women who had said that they wanted no more had nonetheless given birth to an additional child. All together, the “inconsistency ratio” was 20.9% over the five-year period. Although this is one of the lowest inconsistency ratios ever published (due largely to the selection of the sample), it was nonetheless too high to make intentions a useful addition to fertility forecasting.

The next quarter century saw an explosion of papers on the stability and predictive validity of reproductive intentions (e.g., Jones, Paul and Westoff (1980); Nair and Chow (1980); Morgan (1981, 1982); Vlassoff (1990); Bongaarts (1992); De Silva (1992); Tan and Tey (1994); Miller and Pasta (1995); Campbell and Campbell (1997); Bankole and Westoff (1998); Schoen et al. (1999, 2000); Symeonidou (2000); Quesnel-Vallée and Morgan (2003); Hayford and Agadjanian (2017); Trinitapoli and Yeatman (2018); see Cleland, Machiyama and Casterline (2020) for a review of this literature for Africa and Asia). The results of these studies were mixed, in part due to their varying research methods and in part to the different socioeconomic contexts in which the studies were done. All of these studies showed considerable change in stated intentions, although they differed in their interpretation of that change (Is it measurement error? Vague intentions? Changing circumstances? Changing valuation of the circumstances? Imperfect contraception and problems with implementing one's preferences?). In this literature, as in fertility studies more broadly, there has been some divergence of work on developed (wealthy) countries and developing (low-income) countries. Studies in developing countries have tended to stress that intentions do – at least somewhat – predict outcomes, despite the fact that the discordance between intentions and later outcomes have generally been larger than those found in developed countries. In this vein, Campbell and Campbell (1997) argue that fertility intentions have a measurable influence on future fertility behavior in Botswana. De Silva (1992) found that nearly 30%

of women in a Sri Lankan survey had outcomes discrepant to their stated intentions just three years later. In Taiwan, Nair and Chow (1980) found that couples who wanted no more children had significantly lower fertility than did couples who wanted more, although over 30% of the couples wanting no more did indeed bear a child over the 3 year interval. Tan and Tey (1994) argue that Malaysian women's fertility is predicted by their stated intentions, whereas Vlassoff (1990) found no relationship between Indian women's reported desired family size and their fertility ten years later. Reviewing this literature for Africa and Asia, Cleland, Machiyama and Casterline (2020) also point out that while most studies confirm a link from intentions to behavior, this correspondence is far from perfect and varies measurably across samples.

The disparate findings of some of these studies are difficult to interpret, both because of the selection of samples and the structure of the questions. Most of the studies focus on young, fertile, married women – exactly those most able to achieve their fertility desires. At the same time, most of these studies used a single question to assess intentions, asking: “Do you want another child?”, with no temporal referent, reference to the survival of the current child or sex of the future one, or mention of alternate potential futures in which childbearing might be more or less desirable. Thus, many of the women whose behaviors are apparently “inconsistent” may indeed be succeeding in fulfilling some set of reproductive intentions that are outside the frame of the researchers' questions, subject to constraints and depending on context.

Since about 2000, interest in the topic of fertility preferences has diversified (see citations above). Largely accepting that preferences matter for outcomes but do not determine them, contemporary scholars have asked a wider range of questions: How stable are preferences themselves? How are they formed, and what do they mean? How do gender relations, couple dynamics, health status and other factors influence preferences, outcomes, or the degree to which preferences shape outcomes? In contrast to the earlier work, these more recent papers have tended to emphasize uncertainty, indeterminacy, contingency, and ambivalence (see Sennott and Yeatman (2018) for one recent example). For example, Agadjanian (2005) uses qualitative data from Mozambique to explore the common disjunction between stated fertility intentions and contraceptive use, drawing attention to gender dynamics and to the differences between social constructs of contraception and those of reproduction. Also using data from Mozambique, Hayford and Agadjanian (2017) show that women's desire to stop childbearing is associated with their current number of children, marital dissolution or changes in their health. They point out that accounting for such reasons for changes in desires has the potential to improve our understanding of the predictive power of fertility preferences. Rocca et al. (2010) report on a longitudinal study of Latino adolescents in San Francisco, and show that teens' reproductive intentions are quite unstable, and that they do a poor job of predicting reproductive outcomes, even over a short time horizon. Teens with a positive pregnancy test in one wave are more likely to have said in the previous wave that they “strongly do not” want to be pregnant than all other possible answers combined. Jennifer Barber and co-authors have expanded our understanding of time and ambivalence in reproductive intentions: by interviewing young women in Michigan weekly, they show that even transient switches to intending pregnancy are associated both with earlier sex and higher pregnancy rates, even for women who intend to avoid pregnancy in the vast majority

of weekly survey rounds (Weitzman et al., 2017). With other co-authors (Miller, Barber and Gatny, 2013), Barber shows that desire to avoid pregnancy and desire for pregnancy work independently, and that only women who have both a high desire to avoid pregnancy and a low desire for pregnancy in fact have lower pregnancy rates than do women who are actively seeking pregnancy and not avoiding it. Taken as a whole, this literature draws attention to the ways that fertility intentions are variable, internally contradictory, and may or may not predict reproductive outcomes, depending on the context.

Confronted with this rather frustrating empirical landscape, population theorists have sought to develop new models of reproductive preferences and action with sufficient nuance to accommodate the observed uncertainty, ambivalence, and context-dependence. Timæus and Moultrie (2008, 2020) (see also Moultrie, Sayi and Timæus (2012)) have argued that we should recognize a wider range of kinds of intentions that can underlie avoiding a current pregnancy: in addition to “stopping” and “spacing”, they identify “postponing” without specific intentions to return to childbearing in the future and “curtailment” as “parity-independent stopping”. Drawing on contemporary work in cognitive science, Bachrach and Morgan (2013) go further, arguing that reproductive preferences may not even exist except when prompted by specific situations: they are contextual, informed by schemas of childbearing, imbued with affect, and organized by identity. Bhrolcháin and Beaujouan (2019) come to much the same conclusion, proposing that fertility preferences are “constructed”, that is, changeable, context-dependent, and subject to framing effects. In many contexts, they argue, people have no clearly articulated fertility preferences. “When called on either to state a preference, or to act on one, they look for clues and make inferences as to what they would like, and thus how to act, or what preference to declare. In other words, rather than reading off their preference from a stored memory, they construct a preference from available information” (Bhrolcháin and Beaujouan, 2019).

This emerging consensus in fertility studies is consistent with related work in behavioral economics on non-fertility topics. In a variety of contexts, people have a tendency to extrapolate current preferences to different future states of the world (Loewenstein, O’Donoghue and Rabin, 2003), with evidence that this tendency applies to long-term decisions such as whether to attend college, with something as minor as current weather (measured by cloud cover) altering prospective students' probability of reporting that they intend to attend a school (Simonsohn, 2010), and which car to buy (Busse et al., 2015). In addition, a number of scholars have explored the consequences of unstable preferences that strongly depend on circumstances, showing that in these circumstances people cannot correctly anticipate future developments and their impact on one's own preferences. For example, Kuziemko et al. (2018) illustrate these challenges for the case of first-time mothers in the US and the UK, who considerably overestimate their postnatal labor supply both because motherhood is harder than they anticipated and because their interest in working declines. Odermatt and Stutzer (2015) similarly show projection bias in individuals' forecasts of their future life satisfaction following major life events, underestimating adaptation to events such as marriage and widowhood. Although the literature on fertility preferences is rich enough terrain on its own that many fertility scholars do not cite literature on the broader questions of intentions and preferences more generally, fertility preferences in fact appear to work similarly to other kinds of preferences studied by behavioral

economists, as Bachrach and Morgan (2013) and Bhrolchain and Beaujouan (2019) have noted.

The great challenge in evaluating the theoretical claims that fertility preferences are contextual, schema-informed, emotion-laden, identity-related, and constructed in response to specific eliciting stimuli is one of data. To test these kinds of claims requires rich, longitudinal data, including questions about potential futures and remembered pasts that have typically not been included in most commonly used fertility datasets for any poor country, such as the Demographic and Health Surveys (DHS). This paper provides exactly that with rich, longitudinal data from Busia, Kenya that include questions about prospection and retrospection, as well as a detailed set of data about social, economic, household, educational, and health factors over nearly a decade.

2 Data and Methods

Data

The analysis utilizes the Kenyan Life Panel Survey (KLPS), a longitudinal data set seeking to track and collect data from more than 7,500 individuals from Busia, a district in rural western Kenya. (Data from the KLPS project, and the data used for this paper, is accessible online via Harvard's Dataverse: https://dataverse.harvard.edu/.) Starting in 2003, a representative sample of children who participated in a primary school-based deworming program (see Miguel and Kremer (2004)) was chosen to take part in a panel data collection effort, with complete survey rounds (so far) in 2003-05, 2007-09 and 2011-2014 (see Baird, Hamory and Miguel (2008); Baird et al. (2016)). While the respondents are in their mid-to-late-twenties during survey Round 3, in 1998 they were enrolled in grades 2 through 7 in 75 primary schools located in the Budalangi and Funyula divisions in southern Busia. The Primary School Deworming Program (PSDP) – launched by the non-governmental organization ICS in 1998 – provided deworming medication to children enrolled in these schools, where enrollment totaled over 30,000 at the time.

Busia is a densely populated rural farming region in western Kenya, north of Lake Victoria and adjacent to the Ugandan border. It is somewhat poorer than the national Kenyan average and subsistence farming is common, with more than 50% of respondents at KLPS Round 2 working on family farms for subsistence and only 1% growing cash crops. Outside labor market opportunities for young people are scant and while the majority of respondents complete primary school (grades 1 through 8), only half of male respondents and less than a third of female respondents in our sample continued on to secondary education, which typically involves moving away from home.

KLPS respondents are usually interviewed in or near their home. Interviews are conducted by local enumerators either in Swahili or the local language, mostly Luhya. The initial survey questions are drafted in English, then translated and adjusted to fit the context by the local survey team, including intensive testing of out-of-sample respondents, before being back translated to ensure the original intent of the question has been preserved. The interviews are quite thorough, covering questions around marriage and fertility as well as labor market participation, earnings, consumption, health, education, political and

religious attitudes, and migration experiences. These detailed interviews often last 2 to 3 hours in total. If respondents have moved out of the Busia area, survey enumerators travel across Kenya and Uganda to interview these migrants in the same way as those still in Busia. Tracking respondents in rural Africa and conducting in-depth interviews is time intensive, and a full survey round typically takes up to 2 years to be completed. As fewer respondents can be tracked and interviewed towards the later stages of each survey round, the survey team draws a random sub-sample (typically one quarter) of those respondents not yet found and interviewed. This random sub-sample is tracked "intensively" (both in terms of enumerator time and travel expenses) and the resulting additional observations later re-weighted to reflect their representation of the sub-sample not successfully tracked initially and to maintain the representativeness of the overall sample. Throughout the paper, we use survey weights that adjust for this two-stage nature of KLPS tracking and adjust by weights in the later survey round when using data from two survey rounds; for more details on the tracking strategy, see Baird, Hamory and Miguel (2008) and Baird et al. (2016). In short, we follow the procedure also used for the U.S. Moving to Opportunity study (Kling, Liebman and Katz (2007)), calculating an effective tracking rate (ETR) as: $ETR = RTR + (1 - RTR) * ITR$ where RTR denotes the initial, "regular" phase tracking rate and ITR denotes the "intensive" phase tracking rate. The effective tracking rates of the KLPS are above 80 percent; this would be a high rate in any context and it is remarkably so given the context, sample and the long time horizon.

We focus on the portions of the survey containing information on reproductive desires, actual fertility and recall of past desires. While in survey round 2 we collected this information for every participant and did so again in survey round 3 (with the exception of any recall-related questions), in KLPS round 1 these detailed questions regarding reproductive preferences were only posed to a subsample of young women involved in the larger survey. In particular, in KLPS round 1, a randomly selected, representative sub-sample of young women who in 1998 were in grades 4-7 (from the full sample grades 2-7) were selected to be asked these questions. 351 young women who were mostly between 17 to 22 years old at the time of KLPS round 1 data collection in 2003-05 (with an average age of 19) participated in this sub-survey. Thus, for this sub-sample of 351 women, we can supplement KLPS round 2 and 3 data on reproductive desires and outcomes with reproductive desires in survey round 1 and detailed forecasts of how they would adjust their reproductive desires under 19 different scenarios. The detailed data on desires and forecasts from round 1 can then be checked against these women's actual reproductive histories over the next 9 years. Having data about their reproductive desires in round 1 further allows us to make full use of the recall questions asked in round 2 as we can verify their recalled reproductive desires in round 2 against their actual past reproductive desires in round 1. It is this richness of detailed prospective and retrospective measures combined with the long time horizon over which we track this sub-sample that makes us focus on what we term the "analysis sample". The women in our analysis sample were interviewed as part of a representative subset of the older cohort of female KLPS respondents (in particular, females who were in 1998 grades 4-7), and thus are 1.5 years older on average than the extended sample of KLPS women. While 277 and 283 of these women were re-surveyed in Round 2 and 3, respectively, 239 of them participated in all three KLPS rounds. For some supplementary analyses presented

in the appendix, we will make use of all women from the extended KLPS sample (of 7,500 men and women) that participated in KLPS survey Rounds 2 and 3. We call these 2,028 women who participated in these two survey rounds the "extended sample".

Table 1 illustrates for which rounds we have which data for our analysis sample and the "extended sample", and how many respondents we have for each round. Reproductive desires, i.e., the desired number of children, for individual i at survey round t is denoted by $x_{i,t}$. The existence of detailed baseline information on reproductive desires is the main reason why we focus on our restricted analysis sample rather than extended sample respondents, who were not asked these questions. Actual fertility, i.e., the number of children born and alive by survey round t, are indicated by $f_{i,t}$. Recall of past fertility desires for round $t-j$ as collected at round t is denoted as $x^{R}_{i,\,t-j\,|\,j}$.

Reproductive preferences are collected in several different ways. We use a modified version of the DHS question for ideal family size as our measure of fertility desires: "Today, if you could choose exactly, how many children in total would you like yourself or your partner to give birth to (including those who have already been born)?", as well as asking about expected childbearing over specific future timeframes (specifically, 2 years and 5 years), and how the respondent thinks her desires might change under a wide range of plausible future scenarios.

Methods

In order to gain a better understanding of reproductive desires, in this paper we provide a descriptive account of the reproductive desires and histories of Kenyan women over time horizons of 3 to 9 years and report the results in the following section.

We start by showing the overall distribution of changes in the desired number of children by women in our analysis sample, for the time periods between survey Rounds 1 and 3 ($x_3 - x_1$) as well as for changes from survey round 1 to 2 ($x_2 - x_1$) and from survey round 2 to 3 ($x_3 - x_2$). The changes for women interviewed in all three survey rounds are presented in Figure 1 and for most respondents correspond to changes between ages 19 and 28 for the long horizon and an additional observation in between at an age of 23 to 24. The results exclude women who gave non-numerical answers to the desired fertility question in one of the two survey rounds used for each graph and those who changed their desires by more than 4 children. This leaves 231 women. Observations are weighted using survey weights from the later survey round, adjusted for the two-stage tracking design of that round.

We proceed by showing the joint distribution of reproductive desires across survey rounds for women in our analysis sample in Figure 2, for all three combinations of two survey rounds. Women are only included if they were surveyed in all three rounds and gave numerical answers between 0 and 8. The size of bubbles is relative to the number of respondents with a given combination of desired children across two survey rounds, where observations are weighted by survey weights of the later survey round. The presented graphs allow us to examine the changes in more detail, for example assessing how common it is to have desired 3 children in one survey round and to desire 2 or 4 children in the next survey round. Are these changes pure noise or are they associated with observable life events

and individual characteristics? We answer this question by showing differences in the nature of changes for various sub-groups such as unmarried and (newly) married women in our extended sample between KLPS Rounds 2 and 3 (see Figure A.3). In order to assess whether women's reproductive desires contain predictive power about their subsequent reproductive outcomes, we regress the number of their children born between survey round 1 and the later rounds on their desired number of additional children in survey round 1:

$$f_{i,t} - f_{i,1} = \alpha + \beta(x_{i,1} - f_{i,1}) + \epsilon_i$$

for $t = 2,3$, with $f_{i,t}$ indicating individual's i number of live children in survey round t and $x_{i,1}$ their desired total number of children in survey round 1. We conduct these regressions for all 236 women participating in all three survey rounds with numeric answers to the question on their desired fertility and information on their subsequent births. We also run the same regressions for those without any pregnancy by survey round 1 (121 women) and those with at least one pregnancy by survey round 1 (115 women). The results can be found in table 3, where each column represents a separate regression, also including information on the average number of subsequent births between survey rounds and its standard deviation. After having provided descriptive evidence on the (in-)stability and predictive power of women's reproductive desires, and on life events and characteristics associated with changes in reproductive desires, we next turn to women's own perception with regard to the stability of their reproductive desires.

To that end, the KLPS survey was designed to investigate to what degree women can anticipate changes in their own preferences, as part of examining the experiential and cognitive basis of desires. In Round 1 of the survey, we posed a series of hypothetical scenarios known to be at least reasonably common in rural Kenya. The survey asked: “In each situation, would you like to bear the same number of children, or a larger or smaller number?” Women could answer “more”, “same”, “less” or indicate that they don't know. In Figure 3 we first plot the share of the 351 women at baseline who expected to increase, decrease or keep their desires stable under 19 hypothetical examples such as improving or worsening finances, or if all their children turn out to be female or male. Since almost no women said “don't know”, these few answers are dropped – the maximum number of respondents answering “don't know” is 9 to the scenario of being “unable to find husband”, with at most 3 women stating “don't know” for any of the other scenarios. The full list of scenarios is the following: (i) finances improve; (ii) finances worsen; (iii) husband wants more children; (iv) left alone with husband (co-wife leaves); (v) marry soon; (vi) husband takes another wife; (vii) co-wife has many children; (ix) become a junior co-wife; (x) no longer get along with spouse; (xi) unable to find husband; (xii) child fostered away; (xiii) all children are female; (xiv) all children are male; (xv) a child dies in infancy; (xvi) receive a teen foster child; (xvii) receive 3 young foster children; (xviii) pregnancies are difficult; (xix) daughter in law gives birth; and (xx) daughter gives birth. The questions applying to unmarried women only were asked to the subset of 227 unmarried women. Observations are weighted using survey weights from Round 1, adjusted for the two-stage KLPS tracking design.

Finally, for women in our analysis sample we evaluate their recalled desires in round 2 against their actual desires in round 1 and graph their accuracy on how their desires changed (see Figure 4). The KLPS Round 2 survey included the following question: “If I had asked you the same question 3 years ago, how many children in total would you have said you would like you or your partner to give birth to (including those who had already been born)?” This question asks the respondents to remember or imagine what their past self would have said, thereby capturing their understanding of past changes in their own reproductive desires. While this question was asked to everyone participating in survey round 2, for 277 women in our analysis sample we also have information on desires in survey round 1 and can thus assess recall accuracy. We do so by creating three measures of recall behavior. First, we characterize whether a respondent's recalled desires imply that she recalls having lowered her desires, recalls not having changed her desires, or recalls having increased her desires over the past 3 years. Based on this recall measure, we code whether respondents correctly recall the direction of change in desires, or whether they remained unchanged. In addition, we measure the stricter “Correct Recall” as taking the value of 1 if a respondent exactly recalls how many children she desired in the past. Formally, respondents correctly recall the direction into which they changed their desires if $sgn(x_2 - x_{1\mid 2}^{R}) = sgn(x_2 - x_1)$. The last two measures only partly overlap, as some respondents correctly recall the direction of the change but not the exact magnitude. Each group of women – those who experienced lower (N=100 women), unchanged (N=101), or increased desires (N=76) between rounds 1 and 2 – is represented by a bar in Figure 4, where the size of the bar captures the share of women in each group. The shading in each bar captures the correspondence between actual and recalled fertility desires in each group, as discussed further in the results section below. While not all respondents were interviewed exactly 3 years after their Round 1 interview, patterns are largely the same for those who were interviewed 3, 4, or 5 years after their Round 1 interview. We take this as evidence that this imprecision in the question is not driving the results.

Taken together, these descriptive results provide novel evidence on the nature of reproductive desires, their (in-)stability and women's perception of their own desires.

3 Results

In all three rounds, over 90% of the women in our analysis sample report between 2 and 5 desired children (see Figure A.1a for the full distributions), and the average does not change substantively, nor differ substantively between our analysis sample and the extended sample (Table 2). Men report desiring about a quarter of a child more than do women (3.52 compared to 3.25), although – as is common across contexts and datasets – they begin parenthood at older ages than do women (also clearly visible in Figure A.2). Desires in Round 1 are based on little individual experience; the average age of respondents is only 19 for the analysis sample and 18 for the sample of KLPS survey respondents as a whole (extended sample), and only 26% of women have had a child by that point. Desires are also highly idealized, both in the sense of closely conforming to statistical norms in Kenya (3.9, Kenya DHS 2014), and apparently based on the assumption that everything in the future goes according to an optimal life-plan. For example, when confronted with

hypothetical scenarios (explained in greater detail below), most women do not expect their desired fertility to increase under positive scenarios (e.g., a positive household economic shock), but many do expect their desired fertility to fall under certain negative scenarios such as a negative household economic shock. Moreover, when asked whether they would rather choose to have one child fewer or one child more than their desired number, 74% of women say “fewer”, suggesting that, at the point of elicitation, for most of the women, their stated desires represent an upper bound of the number of desired children. These look very much like the abstract, socially constructed ideals that Bhrolchain and Beaujouan (2019) describe for young people with limited personal experience with childbearing.

Although total fertility desires remain mostly flat at the aggregate level, there is considerable change at the individual level: between Rounds 1 and 3, 63% of the analysis sample respondents change the number of children that they report desiring in their lifetimes overall, and 20% change by 2 or more children (as shown in Figure 1). For women from the extended sample, we see a similar level of variability between Rounds 2 and 3. While the literature on fertility preferences in Africa and Asia has documented variability in women's preference to stop childbearing (Cleland, Machiyama and Casterline (2020)), we hereby document that this variability extends to the intensive margin of how many children women and men desire. One advantage of focusing on the intensive margin is that it allows us to identify changes in desires at every point of each individual's reproductive history, even if they are still 2 or 3 children away from their desired family size. The pattern of aggregate stability and individual-level change we find resembles the findings of Quesnel-Vallée and Morgan (2003) for the United States; however, the social process underlying the result appears to differ. In the U.S., Quesnel-Vallee and Morgan find that people settle downward, to eventually report desires at the level of fertility that they can realistically attain, and that changes in desires are more commonly toward the total fertility rate (TFR) than away from it (so that people who initially desire more than 2 are more likely to reduce their desires and those who initially desire fewer than 2 are more likely to increase). By contrast, in Busia, Kenya, we find that average reported desires across survey rounds fluctuate down- and upward and that average reported desires slightly increase with respondent age within survey Rounds 2 and 3 (see Figure A.2), although the average result is driven mostly by the right tail (desires for 5 or more children): the median remains at three children in all three survey rounds, and the mode actually declines from four children (essentially the national TFR) in Round 1 to three children in Round 3 (see Figure A.1a). These patterns signal an increasing dispersion in reported desires: 23% of our respondents changed their desires toward the national TFR of 4, whereas 40% changed their desires away from 4, and 37% reported no change. The results in our sample are broadly similar to those presented in Askew, Maggwa and Obare (2017) for the whole of rural Kenya, where the wanted fertility rate (WTFR) declined from 3.9 in 2003 to 3.4 in 2014. The difference in the direction of change between our data and theirs is likely the difference between period and age effects, although we cannot prove that conclusively.

The variability of individual fertility desires – possibly due to life outcomes in rural Kenya being uncertain – does not, however, mean that reported desires or changes in desires are entirely chaotic or unstructured. First, when classifying women's individual history of fertility desires over survey rounds, 88% can be classified as following one of four main

patterns: 20.4% show stable desires, 16.6% show “vacillating” desires (defined below), 26.3% have decreasing desires across rounds, and 24.8% have increasing desires. [Note that 12% of respondents do not fit neatly into this classification; refer to table A.2 for a detailed overview of fertility desires over all three survey rounds.] There seems to be some order and meaning in these changes and not just noise. The classification follows the following rules: “stable" includes all women with the same desires across all three survey rounds ($x_1 = x_2 = x_3$), “vacillating" includes those with the same desires in survey rounds 1 and 3, but a different desire in round 2 ($x_1 = x_3 \neq x_2$), “decreasing" encompasses all those with lower desires in survey round 3 than 1 and desires in round 2 that are in between ($x_3 < x_1$ and $x_3 \leq x_2 \leq x_1$), and “increasing" includes those with higher desires in round 3 than in round 1 and intermediate desires in round 2 ($x_3 > x_1$ and $x_3 \geq x_2 \geq x_1$).

Many individual characteristics appear to be related to desires and changes in them, including motherhood, marriage status and the gender composition of one's children (see Figures A.3 and A.4, both based on the extended sample). For example, women who were married were somewhat more likely to increase their desired fertility (with 38.6% increasing and 24.7% decreasing desires), while women who remained unmarried were more likely to decrease it between survey rounds 2 and 3 (with 32.9% decreasing and only 27.6% increasing desires). The average change in desires also significantly differs between these two groups, with already married women increasing desires between survey Rounds 2 and 3 by 0.11 children and unmarried women lowering desires by 0.04 children on average. The pairwise t-test indicates that this difference is significant at the 5%-level.

Similarly, women in the extended sample who remained childless by their late twenties in Round 3 were slightly more likely to have had stable desired fertility over time than did women who bore children earlier (although a full 58% of them still changed stated desired fertility across survey rounds). These results line up well with the finding by Hayford and Agadjanian (2017) that for women in Mozambique changes in their desire to stop childbearing are associated with life events such as marital transitions. Characteristics of women and couple dynamics also matter, as we would expect given the mutual endogeneity of desires, partner choice, and other aspects of women’s behavior: women who (in Round 3) said that they had at least a joint say (rather than less say) over whether to have another child with their partner were 8 percentage points less likely to have increased their desired fertility and 13 percentage points more likely to have lowered them. These differences in power dynamics within couples offer one potential reason behind the literature's disparate findings on the predictive power of spousals' fertility preferences (as summarized by Cleland, Machiyama and Casterline (2020)), suggesting a potential role for these dynamics to account for differences in the importance of spousal preferences within and across populations.

Consistent with most studies of reported fertility intentions and later reproductive outcomes, we find an association between the two that is neither trivial nor overwhelming. We observe associations in two kinds of data. First, for women in our analysis sample, we regress their number of children born between Round 1 and Rounds 2 and 3 on their number of desired children in addition to their living children in round 1. Higher fertility desires in Round 1 are associated with more additional children born by Round 3: reporting desiring one additional child is, on average, associated with having had roughly 0.2 more children between Rounds

1 and 3. The same association for the two subgroups of a) women without any children at Round 1 and b) those with at least one child by Round 1 is 0.3 additional children (see table 3 for results). Since the average age for the analysis sample women in Round 3 is only 28, this would be consistent with at least a half-child difference by menopause. Second, women who reported expecting to have a child in the next 2 or 5 years are more likely to have one than are women who report not to expect having one. Over the next 2 years, women's expectations to have a child are strong predictors of having another child, with those expecting to have another child being twice as likely to have a child, at 59% compared to 30%. The predictive power of their expectations over a time horizon of 5 years is more modest, however, with those expecting to have another child being 32% more likely to have a child (79% compared to 60%). This shows that while expectations are predictive of actual fertility, the “error rates” for women not intending to have a child are quite high: 30% (60%) of women not expecting to have a child in the next 2 (5) years ended up having one (see Appendix Table A.1 for more details).

These are young women, mostly less than halfway through their childbearing years by KLPS Round 3. And yet, 11.5% of women had borne more children by Round 3 than they reported desiring in Round 1, and another 23.4% had exactly reached their first-reported desires, with another 15 or so years of fecund life still ahead. Without additional information, these additional children could be either unexpected (perhaps as the result of contraceptive failure) or due to respondents deciding that they want more children and acting upon this change in preferences.

In order to examine whether such changes come expected or unexpected, we present women's answers to the 19 hypothetical scenarios for which they were asked: “In each situation, would you like to bear the same number of children, or a larger or smaller number?” For most scenarios, the vast majority of women said they would either want the same or a smaller number of children. As shown in Figure 3, the only scenarios in response to which at least 10% of women would like to have more children are: improving household finances; a situation in which all children are of the same gender; and if her husband wants more children. A sizable share also states a desire to have more children in case a child dies in infancy, most likely not reflecting an increase in their desired family size but maintaining their desired family size by giving birth to one more child. That said, only about 25% of respondents expect to increase desired fertility under the latter two scenarios, whereas 70% do not expect to change desired fertility at all. In comparison, in the case of worsening household finances, 55% of respondents state that they would want to have fewer children, and even higher shares of women state that they would reduce desired fertility if they no longer got along with their spouse, or if their pregnancies were difficult.

The patterns documented in Figure 3 suggest that respondents expect to respond asymmetrically to positive and negative life scenarios: they state that they would largely not update their desired fertility under positive scenarios, but would lower it under negative scenarios, such as the negative household economic shocks that are all too common in Kenya. This supports the idea as put forward in the discussion that “desires”, especially at young ages, are statements of ideals: constructed in the context of the elicitation process, and informed by experience, schemas, emotion, and identity. But note that the respondents'

initial forecasts that their desired fertility would be unchanging or even decreasing over time stands in contrast to the fact that desired fertility does change substantially across survey rounds for many respondents, and often in an upward direction: 30% of women increased their stated desired fertility between Rounds 1 and 3. Respondents' forecasts about how they would respond to particular scenarios also appear to understate how responsive their fertility would be: for instance, while 25% of women in our analysis sample expect to increase their desired fertility in the case in which all children were the same gender (in the initial survey), 67% (50%) of women in the extended sample actually increased their stated desired fertility in a future survey round when they had had only daughters (sons), and had reached, but not yet surpassed, their previously reported desired number of children (see Figure A.4). Expectations about changes in future desired fertility also seem to be systematically inaccurate for the case in which a woman's husband takes another wife: while respondents on average expect to have falling desired fertility in this case, women in our data who had no co-wife at Round 2 but did have one by the Round 3 survey were 10 percentage points more likely to have increased desired fertility.

Overall, respondents' inability to anticipate upward changes in desires therefore seems to stem both from underestimating the likelihood of increasing desires in response to certain scenarios (such as only having daughters) and the possibility that while additional children often do not follow increased fertility desires, higher stated desires often follow having additional children. Our interpretation of asymmetric expectations could change if there are scenarios for which women would anticipate upward changes in desires that we may have missed in our survey. We do not think, however, that the documented asymmetry is simply due to missing scenarios. First, some of the elicited scenarios encompass many more concrete examples, e.g. “husband wants more children” could be seen as a general case for remarrying or improving finances as covering improved job opportunities. Second, the comparison between improving vs. worsening finances nicely illustrates this general asymmetry: while almost 60% of women forecast lower desires in the case of worsening finances, only around 10% expect to increase their desired fertility in the case of improving finances. This gives us more confidence that our scenarios do capture the general asymmetric nature of respondents' expected adjustments.

Despite the fact that many individuals' reported fertility desires changed substantially over time, few individuals appear able to recall these changes when asked in later survey rounds (see Figure 4). We find that only about 30% of respondents correctly recalled their own past fertility desires, and fewer than 40% correctly recalled even the direction of the change in their desired fertility over time. Moreover, while only 40% of women had not changed desires between survey Rounds 1 and 2, more than 70% of women believe they have not changed desires. This share is almost exactly the same for women in the extended sample. Among those women whose desired fertility changed across survey rounds, just 9% were able to correctly recall their earlier stated desired fertility (and only 19% recall the change in sign). Figure 4 presents women's recalled change in desires depending on having had stable desires or having lowered or increased them. While just 12% of those whose stated desired fertility increased across survey rounds are able to recall the direction of the change over time, a much higher proportion (25%) of respondents whose desired fertility fell over time were able to recall the direction of the change. Moreover, women who have increased

desires are also more likely to believe they have not changed desires than those women who lowered their desires from survey round 1 to 2 (and even more likely than those who actually had stable desires). Recall is thus strongly anchored at current fertility desires, and it is particularly so for those whose desired fertility increased over time.

Taking all of this together, three empirical patterns stand out with respect to recall. First, recall of past fertility desires is inaccurate overall, with most respondents failing to recall their past desired fertility. Second, this appears to be largely driven by recalled desired fertility being strongly anchored at current fertility desires. Third, this anchoring is most pronounced, and recall errors therefore most common, for women whose desired fertility increased over time. Given that most respondents believe they did not change their desired fertility at all, current preferences may not only affect forecasts of future preferences (as in projection bias), but also perceptions of past preferences. This "retrospection bias" implies that many people find it difficult to imagine that they ever wanted to have a different number of children in the past, a pattern that could be driven by a desire for cognitive consistency over time. Cognitive consistency cannot, however, easily account for the asymmetric recall performance we document above, in which those who have rising desired fertility over time appear to have particular difficulty recalling their earlier desires.

4 Discussion and Limitations

Discussion

Bachrach and Morgan (2013) argue that fertility intentions emerge over age, as people live through a variety of experiences and figure out who they are and what their lives are likely to yield. In the U.S., social institutions are strong and unified enough that fertility desires and outcomes converge as people age; in Busia, Kenya, people start out with relatively homogenous ideals, assuming an idealized life course. However, life there has a much greater element of chance and variability, and as a result, as people age, their fertility desires and actual fertility diverge, consistent with Bachrach and Morgan's (2014) prediction. Increasing variability in reproductive desires and actual fertility is one of the many concrete consequences of the pervasive uncertainty of life in Africa that has so long been described (for example, Whyte (1997); Johnson-Hanks (2006); Cooper and Pratten (2014)).

The women in our sample are young women, at an age of around 28 mostly less than halfway through their childbearing years by KLPS Round 3. And yet, 11.5% of women had borne more children by Round 3 than they reported desiring in Round 1, and another 23.4% had exactly reached their first-reported desires, with another 15 or so years of fecund life still ahead. Under conventional models of fertility behavior, in which fertility outcomes are driven by explicit choices, this would mean either that these respondents later decided that they did in fact want more children and acted upon this change in preferences, or they had additional children unexpectedly, perhaps as the result of contraceptive failure. But in the constructed intentions perspective of Bachrach and Morgan (2013) and Bhrolchain and Beaujouan (2019), this result is a straightforward consequence of young people starting out with vague and idealized "desires" – basically guesses about what "successful people around here" would say – which then become increasingly conscious, concrete, and realizable as the

young people grow into adulthood, marry, and begin childbearing. For some, that will mean having more children than they initially reported desiring because their desires were formed through the process of their actualization.

One striking feature of constructed intentions is that most people are unaware of their fluidity, emotional coloring, and context-dependence. Although we can imagine situations in which people could articulate that their desires could easily change, or that they are indifferent between having 3, 4 or 5 children, that is not the mental state described by a model of constructed preferences, nor is it what we find empirically. Overall, our data indicate that although experiencing meaningful changes in reproductive desires over time appears to be the norm rather than the exception among young Kenyans, most people believe their fertility desires to be quite strongly and stably held, both in the past and in the future.

So respondents seem to find it challenging to both imagine changing desires in the future – possibly suffering from projection bias – as well as to imagine having changed desires in the past. Moreover, both in anticipation and retrospection women underestimate the extent of increases in fertility desires: at first you cannot imagine ever wanting more children than you currently desire, and once it has happened, you cannot imagine you ever wanted fewer children! While a desire for consistency cannot explain this asymmetry, self-identity could be at play and drive asymmetric memory, similar to patterns of asymmetric updating (e.g., about one's IQ), as documented in the cognitive science and behavioral economics literatures. This is a social context where controlled and low fertility are symbolically associated with modernity and education, so that a perceived lack of control over one's fertility might be viewed negatively. In addition, the possibility of implying current or future children might have been (or will have been) undesired could appear as cruel to many and thus also drive them to rationalize these children as always having been desired. As such, our finding of asymmetric recall of past fertility desires is related to a recent study by Zimmermann (2020), who finds asymmetric recall of one’s IQ-test results a month later, a result driven by motivated reasoning. Further examples from lab-settings include Eil and Rao (2011) and Mobius et al. (2011).

Three additional patterns in recall behavior provide further suggestive evidence that active manipulation of memory is playing some role, too. First, those whose desired fertility rises over time are more likely than others to believe that their desired fertility has not changed at all (i.e., that they always wanted as many children as today). As shown in Figure A.7, this recall behavior causes “recalled” excess fertility to be much lower than excess fertility when measured using respondents’ actual past desires. Second, this asymmetry in recall is particularly strong for those who initially had children or were married at the time of KLPS Round 1, and are much weaker for others (see Figure A.5). Both, mothers and married women might be most likely to have more children soon and thus to indeed have more children than initially desired. Third, while those having lowered desires by 2 children rather than only 1 child are much more likely to recall having lowered desires, there is no such difference for those who increased desired fertility by one or two children, despite an increase by 2 children being potentially much more salient (as shown in Figure A.6).

Our findings of biased memory of past desired fertility are consistent with other evidence of retrospective rationalization found in the literature on measuring unwanted births (e.g., Smith-Greenaway and Sennott (2016); Rackin and Morgan (2018)). Rackin and Morgan (2018) for example also find much lower unwantedness using retrospective than prospective measures (9% vs. 25% of births). Retrospective rationalization thus seems to matter both for measures of fertility intentions and desires. The exact details of changes in retrospective reports likely depend on the sample, context, and the circumstances of births. For young mothers aged 18 to 24 in the United States who are repeatedly asked about their first birth for example, Guzzo and Hayford (2014) do not find any aggregate increases in reported wantedness over time. Note that in this sample, already in the first interview after their first child, 60% of women report their first birth as unintended.

An important shortcoming of using prospective measures of desired fertility as a benchmark for measuring undesired fertility is that it does not allow to cleanly identify the number of undesired children, because it is conflated by unanticipated changes in desires. Despite this important shortcoming, we think that capturing both without disentangling them is still informative, as we might be interested in whether family planning programs reduce both unanticipated increases in desires and unwanted children together. As such, contrasting retrospective to prospective measures of fertility desires allows us to understand to what extent people recall whether any children were undesired or whether they experienced unanticipated increases in desires. Our results hint at the possibility that respondents do not just struggle to declare children as unwanted ex-post, but also struggle to remember unanticipated increases in desires. Future research could try to understand the reasons and motivations behind inaccurate and biased memory in more detail and potentially contribute to overcoming some measurement issues in assessing whether children were desired or not. This, in turn, might facilitate more accurate analyses of the consequences of undesired births similar to Smith-Greenaway and Sennott (2016).

Limitations

While the presented results and the discussion highlight the richness of our dataset, the data and the presented results are not without limitations. Given the ambitious undertaking of tracking thousands of respondents throughout their twenties, respondents are only interviewed every 3 to 5 years. As a consequence, we cannot easily narrow down when and why respondents have changed their desired family size. We can point to characteristics and life events associated with changes, but do neither prove nor claim clear causal relationships. In addition, our measurement of the desired number of children is subject to noise, and we cannot disentangle what share of changes in desires is due to noise and what share is due to real changes in desires. However, we see two key reasons why most increases in (stated) desires are unlikely to be simply due to noise and more likely due to genuine (possibly unexpected) changes: for one, women stated that they would rather have one child less than one child more than their desired number of children. Second, when asked to forecast how they would change their desires under 19 different scenarios, very few women forecast that they would increase their desires under any scenario (but many forecast they would lower their desires under certain scenarios). Since our sample does not cover all relevant ages, we can only make statements about young women in their twenties. At this point, we therefore

cannot say whether fertility desires become more stable in women's thirties or whether actual and desired fertility continue to increase (unexpectedly).

The sample size of our analysis sample is on the smaller side compared to other studies in the literature. It is therefore important to note that the selected women for the analysis sample constitute a representative sub-sample of women in the whole KLPS and that the results do not significantly vary between the larger, extended sample and the analysis sample where this comparison is possible. For this reason, the advantage of having detailed data on reproductive desires and expectations prevails over the disadvantage of a smaller sample. It allows us to track fertility desires and outcomes over 9 years, to compare changes to expectations and to assess their recalled desires against their actual past desires. Ideally, some of these components will be replicated and extended to other contexts and larger samples. Forecasts are hard to evaluate as it is rare that only one aspect changes in life, and detailed evaluations of forecasts therefore ideally require detailed information from large samples. Finally, our measure of recall asked respondents to recall how many children they would have desired 3 years ago, when respondents were interviewed 3, 4 or 5 years ago. Some of the inaccuracies in recall might stem from this imprecision, although our analyses suggest that it is unlikely our results would change much with a more precise question. Still, with the current data we can only describe respondents' retrospective perception and only speculate about potential reasons and motivations behind the observed inaccurate and asymmetric recall performance. Future studies can and should improve on this margin.

5 Conclusion

Demographers have long sought to make sense of fertility preferences, often working with a model of reproductive action based in the deliberative equilibrium of rational choice. Over the last twenty years, a wide range of scholars have drawn attention to the inconsistencies and uncertainties of reproductive preferences and actions, especially in low-income countries. At the same time, scholars in behavioral economics and cognitive science have developed a rich theoretical framework for understanding human decision-making and action “in the wild”, noting not only consistent patterns of bias and rules of thumb, but also ways in which action is not decision-bound at all. Bringing together the empirical fertility literature with these new theoretical models, several scholars – notably, Bachrach and Morgan (2013) and Bhrolchain and Beaujouan (2019) – have argued that reproductive preferences are constructed in response to specific contexts that elicit either a verbal articulation of an intention, or a reproductively-relevant action. Reproductive preferences in this framework are changeable, contextual, informed by schemas of childbearing, imbued with affect, and organized by identity.

In this paper, we have used a rich multi-year panel dataset including information on reproductive desires and outcomes among a population of young adults in western Kenya to evaluate the constructed preferences perspective. We find support for most of its elements. Even in the context of a life domain as important as having children, desires vary substantially over time: across horizons of 3 to 9 years, more than 60% of respondents change their stated desired number of children, and 20% change by 2 or more children. Second, we find that many women underestimate how strongly they will adjust their

preferences to certain scenarios, and mispredict own fertility behavior over the next 2 to 5 years. For instance, when asked how they would react to scenarios such as getting married soon or all children being of the same gender, most respond that they would still like to have the same number of children. For a small number of negative scenarios such as difficult pregnancies or worsening finances, sizeable shares assert they would prefer fewer children. Opting to want more children is quite rare, and never a majority response to any scenario posed.

Despite these asymmetric expectations, large shares of respondents have both upward and downward changes in stated desired fertility between ages 18 and 28. For example, while around 27% (24%) of women expect their desired fertility to increase in the case in which all children end up being girls (boys), 67% (50%) of those whose children all turned out to be daughters (sons) actually increase their desired number of children in future survey rounds. Young Kenyan adults who had anticipated being largely indifferent to the gender of their children in fact end up caring more than they had thought. We also find expectations to be incorrect in a more immediate way: when asked whether they expect to have another child in the next 2 or 5 years, sizable shares mispredict their own behavior: 30% (60%) of women not expecting to have a child in the next 2 (5) years ended up having one. Together with increases in desired fertility across survey rounds, these patterns suggest that ex-post rationalization matters as well.

Third, we document that very few women are able to recall past desired fertility from three years ago: only 31% correctly recall what they previously reported their desires to be, and just 9% of those who have changed their stated desired fertility correctly recalled their previous report. Instead, most believe they desired the exact same number of children 3 years ago as today. The strong anchoring at current desires suggests that current preferences not only exert a strong influence on expectations of future desires but also on recall of past preferences. The pattern is strong enough that we should hesitate to infer cohort change when we observe an age pattern in the classic DHS question “If you could go back to the beginning of your reproductive life and have exactly the number of children you wanted, what number would that be?” Memories of one's own past desires are just not good enough for that question to work in the many of the ways it has been used.

Finally, we find that the anchoring at current preferences is asymmetric: it is particularly strong for those with higher stated desired fertility today than before. Given this asymmetry is only present for married women and mothers, it appears the difference does not stem mechanically from differences between upward or downward changes, but rather social identity and schemas of self, as people construct images of themselves and their families consistent with the kinds of lives they want to live and the kinds of people they hope to be. While the illusion of stable and effective preferences is held by many of our research subjects, we see no reason why we as researchers should share this illusion.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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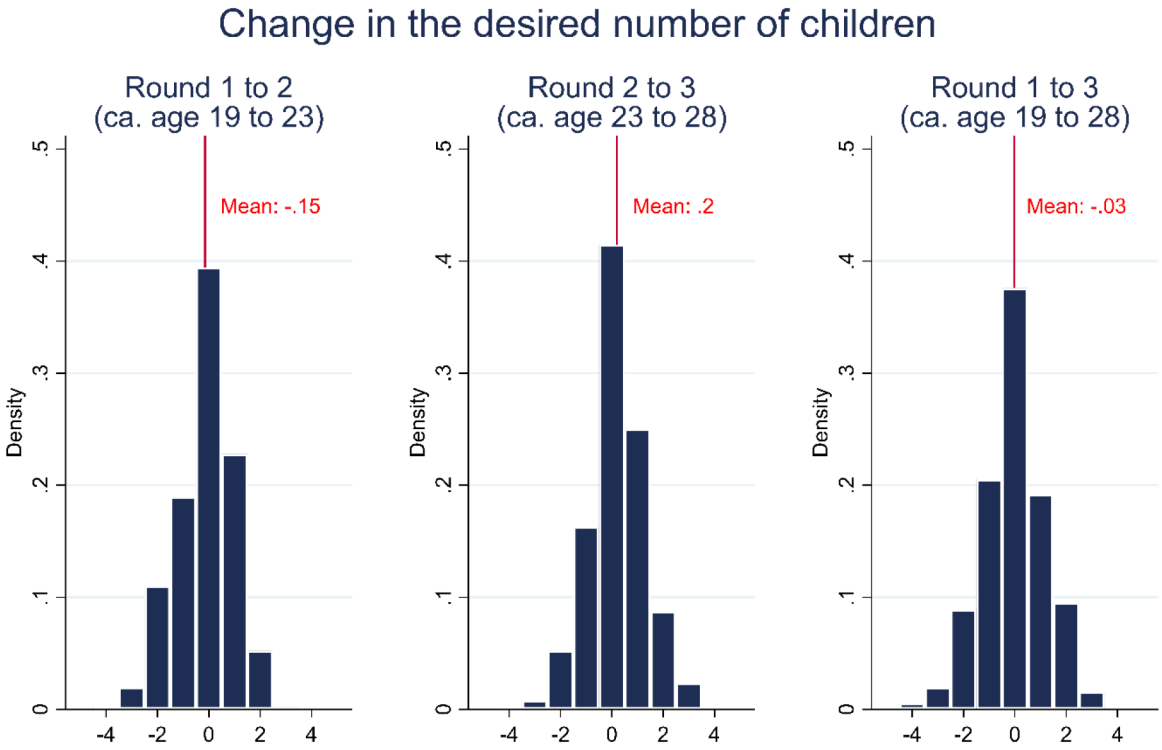
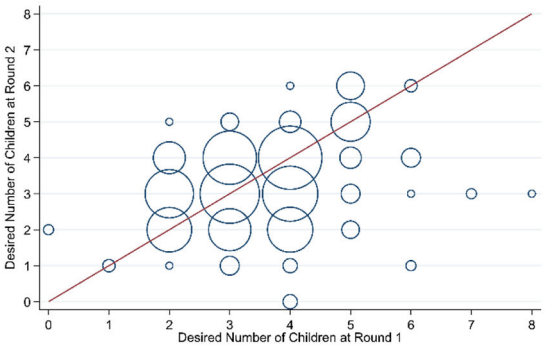


Figure 1: Distribution of changes in desired children between survey rounds

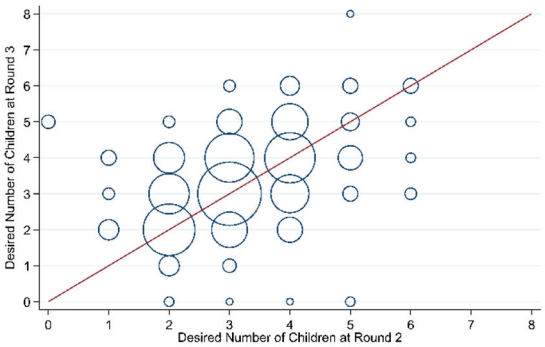
Notes: This figure plots the distribution of changes in fertility desires between KLPS survey Rounds 1 and 2 ($x_2 - x_1$), Rounds 2 and 3 ($x_3 - x_2$), and Rounds 1 to 3 ($x_3 - x_1$) for the 239 women of the analysis sample who were interviewed in all three survey rounds. Women who gave non-numerical answers to the desired fertility question in one of the two survey rounds used for each graph or changed their desires by more than 4 children are dropped, leaving 231 women. Observations are weighted using survey weights from the later survey round, adjusted for the two-stage tracking design of that round. The vertical lines denote the average change in desires, with −0.146 between round 1 and 2, +0.196 between round 2 and 3, −0.029 between round 1 and 3.

(a) Desired number of children in rounds 1 and 2



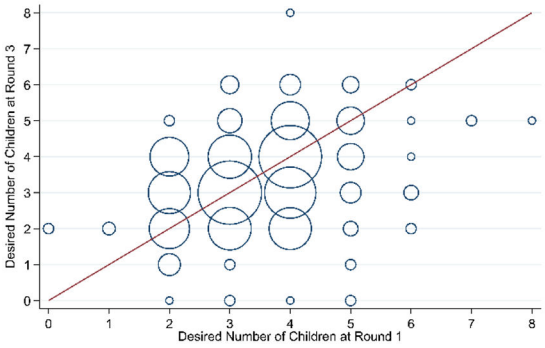
Sample Size	235
On-Diagonal	39.8%
Off-Diagonal	60.2%
Below Diagonal	32.4%
Above Diagonal	27.8%

(b) Desired number of children in rounds 2 and 3



Sample Size	237
On-Diagonal	40.8%
Off-Diagonal	59.2%
Below Diagonal	22.3%
Above Diagonal	36.9%

(c) Desired number of children in rounds 1 and 3



Sample Size	236
On-Diagonal	37.2%
Off-Diagonal	62.8%
Below Diagonal	32.0%
Above Diagonal	30.8%

Figure 2: Distribution of desired number of children across survey rounds

Notes: These figures show the shares of respondents in the analysis sample who were interviewed in all three survey rounds for each combination of desired children in Rounds 1 and 2, 2 and 3 and 1 and 3 (as long as the number of desired children is 8 or lower in both survey rounds). The size of the bubbles is relative to the number of respondents with a given number of desired children in two survey rounds, where observations are weighted by survey weights of the later survey round appropriately adjusted for the two-stage tracking design of the KLPS survey. For more details, see table A.2.

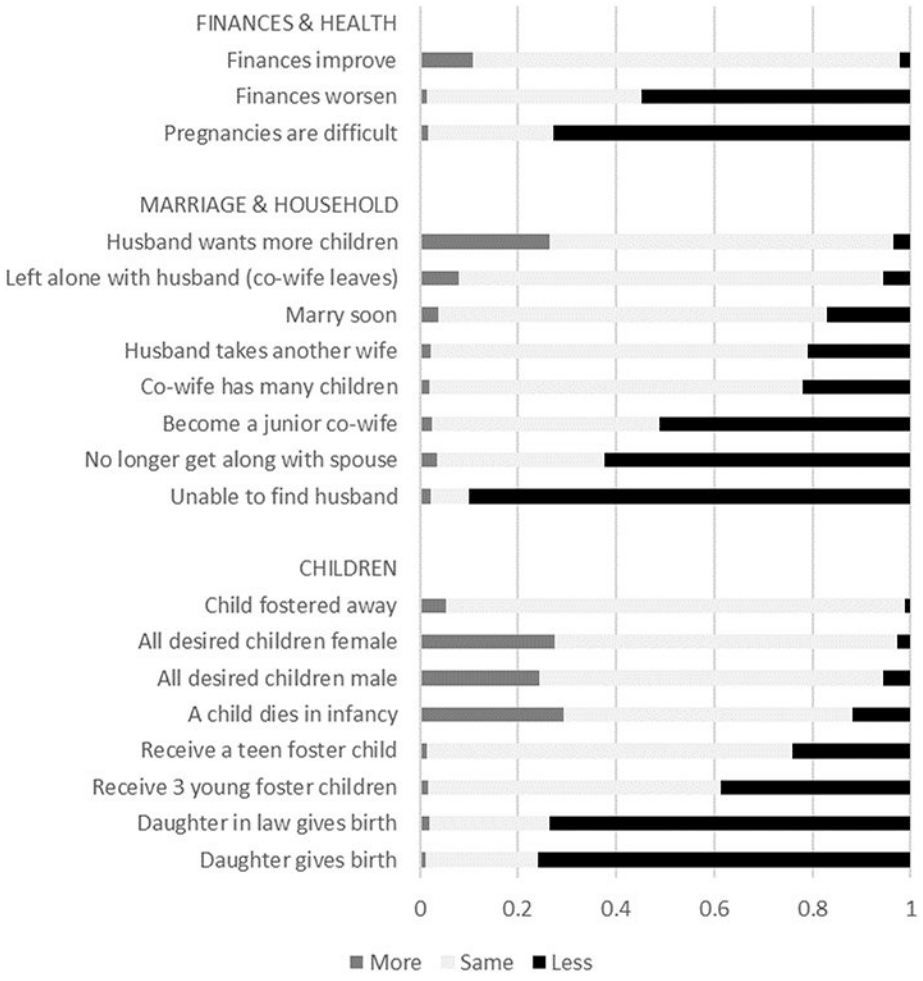


Figure 3: Expectations for different scenarios: "In each situation, would you like to bear the same number of children, or a larger or smaller number?"

Notes: This figure portrays the share of women in the analysis sample who answered "more", "same" or "less" for 19 hypothetical scenarios presented in the KLPS Round 1 survey. Respondents answering "don't know" to a specific question are dropped. The maximum number of respondents answering "don't know" is 9 (for the scenario "Unable to find husband"). For all other scenarios, at most 3 women said they do not know. Answers are available only for the women included in the analysis sample, for a total of 351 women. Those questions only applying to unmarried women were asked to the subset of 227 unmarried women. Observations are weighted using survey weights from Round 1, adjusted for the two-stage KLPS tracking design.

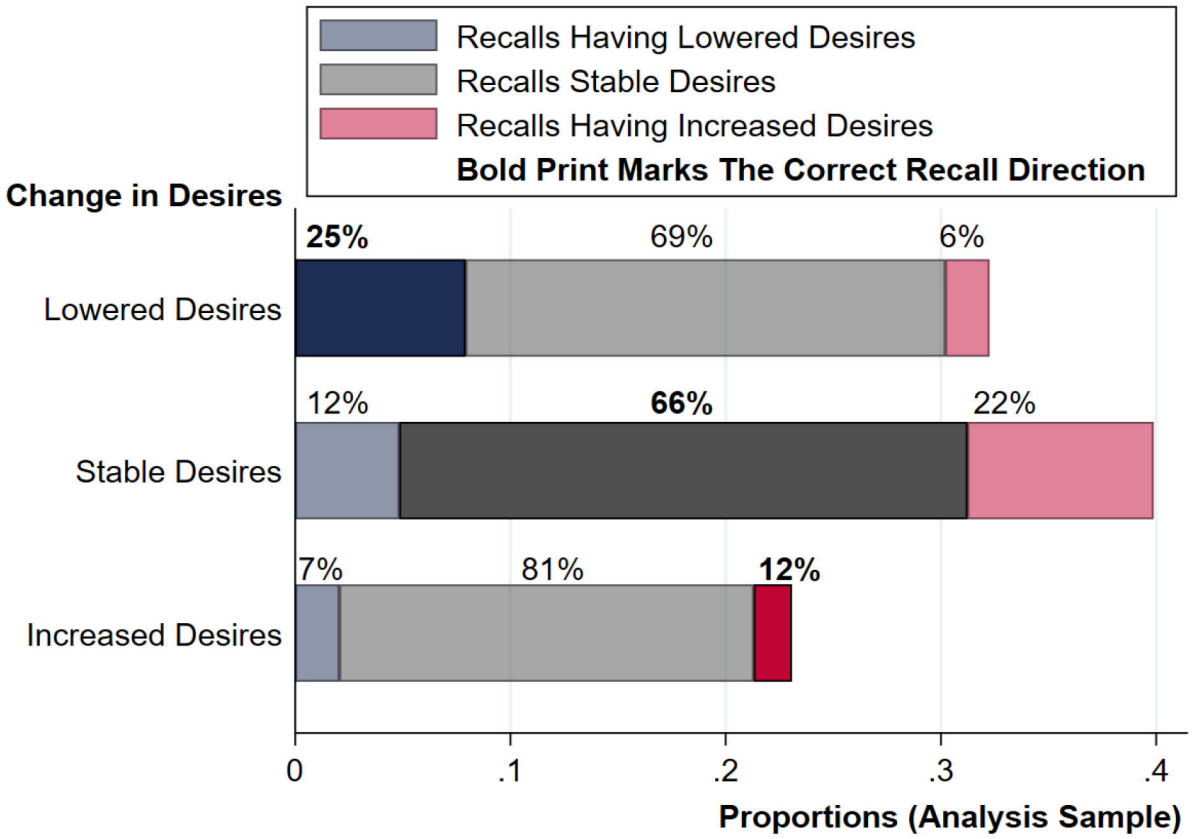


Figure 4: Recall patterns: Recalled direction of change in desires at round 2 conditional on direction of change in fertility desires between round 1 and round 2

Notes: This graph plots the recalled direction of change in desires for all 277 women of the analysis sample interviewed in both Rounds 1 and 2, conditional on whether they had lowered their desires, had stable desires or had increased their desires between survey rounds 1 and 2. The graph uses Round 2 observation weights adjusted for the two-stage KLPS tracking design. The recalled direction of change in desires is constructed in the following way: an individual recalls having lowered if $x_{1|2}^{R} < x_2$ (i.e. if she recalls a higher desire than she currently reports), having had stable desires if $x_{1|2}^{R} = x_2$ (i.e. if she recalls the same desired fertility as she stated in round 2) and having increased desires if $x_{1|2}^{R} > x_2$ (i.e. if she remembers a desired fertility that is lower than her current desired fertility). Women's change in desires is coded similarly: those whose desired fertility was higher in round 1 than 2 have lowered their desires (i.e. $x_1 > x_2$), they had stable desires if the desired fertility was the same in both rounds ($x_1 < x_2$) and they have increased their desires if their stated desired fertility in round 2 is higher than in round 1 (i.e. $x_1 < x_2$). This figure indicates the proportions of women with lower, equal or increased desires (from top to bottom) and for each group reports which share within this group recall having lowered desires, having had stable desires or having increased desires. For each group, the “correct” recall direction is emphasized in bold colors. Note that those who lowered their desires are more than twice as likely to correctly recall the direction of change than those who increased their desires (25% vs 12%, with a p-value of .025). Those who increased desires in turn are

more likely than those who lowered desires to believe they have had stable desires (81% vs. 69%, p-value of .062), and even more so than those who actually had stable desires (81% vs. 66%, p-value of .021). P-values from Fisher's exact test and bootstrapped (with 1,000 draws) tests for decreasing vs. increasing desires (using unweighted shares) are as follows: 0.122 and 0.071 for correct recall, 0.040 and 0.034 for recall direction and 0.061 and 0.052 for recalling 0 change.

Table 1:

Survey timing & data availability

		Round 1 (2003 – 2005)	Round 2 (2005 – 2007)	Round 3 (2011 – 2014)
Analysis Sample	# Respondents	351	277	283
	Median Age	19	23	28
	Data Availability			
	Desires (x_t)	✓	✓	✓
	Recall ($x^R_{t-1 \mid t}$)	-	✓	-
	Living Children (f_t)	✓	✓	✓
Extended Sample	# Female Respondents	2,343	2,506	2,575
	Median Age	18	22	26
	Data Availability			
	Desires (x_t)	-	✓	✓
	Recall ($x^R_{t-1 \mid t}$)	-	✓	-
	Living Children (f_t)	✓	✓	✓

Notes: This table shows the timing of each KLPS survey round used in our analysis, the number of respondents interviewed and their median age as well as availability of key variables used in this paper. Respondents are from the Kenyan Life Panel Survey (KLPS), a longitudinal dataset tracking more than 7,500 individuals who lived in Busia District, Kenya in 1998. The analysis sample consists of 351 women who were interviewed in great detail about reproductive desires in KLPS Round 1 (see the text for more details). 277 and 283 of these women were re-surveyed in Rounds 2 and 3, respectively, and 239 were interviewed during all survey rounds. The extended sample consists of all individuals interviewed in KLPS Rounds 1, 2 or 3 with women and men constituting equal shares of the sample. Expectations with respect to future fertility desires and behavior were only asked in Round 1, and recall was only a component in Round 2. We focus on individuals in the analysis sample in our analysis, because we have data on reproductive desires of these individuals from Round 1 on, such that we can track changes for all survey rounds and compare recall of past desires from Round 2 to actual desires in Round 1. Throughout the paper, we use survey weights that adjust for the two-stage nature of KLPS tracking; for more details on the tracking strategy, see Baird et al (2016) and Baird, Hamory, and Miguel (2008).

Table 2:

Summary statistics

	Women					
	Analysis sample			Extended sample		
Round	**1**	**2**	**3**	**1**	**2**	**3**
Age	19.30	23.46	28.11	17.62	21.47	25.91
# Desired Children	3.46	3.29	3.39	N.A.	3.25	3.27
# Living Children	0.75	1.64	2.34	0.35	1.07	1.85
Parent	0.48	0.73	0.88	0.26	0.57	0.79
Married	0.43	0.67	0.80	0.24	0.50	0.72
Observations	239	239	239	2,343	2,506	2,575

Notes: The data shown for the analysis sample includes only the 239 women interviewed for all survey rounds. The data shown for the extended sample includes all individuals interviewed in the round listed at the top of the column. Weighted averages are presented here, where survey weights are adjusted to take into account the two-stage tracking design of the KLPS in each round. “Parent” is an indicator taking the value 1 if the individual has at least one living child. “Married” is an indicator taking the value 1 if the individual is married at the moment of the interview for the given survey round. Desired fertility at the time of Round 1 was only gathered from the analysis sample individuals.

Table 3:

Regressions of actual fertility (number of additional children) on reproductive desires (desired number of additional children)

	Dep. Var.: **Number of additional children between Round 1 and …**					
	Round 2	**Round 3**	**Round 2**	**Round 3**	**Round 2**	**Round 3**
	All Women		**Pregnancies>0 (Rd 1)**		**Never Pregnant (Rd 1)**	
Desired number of additional children (round 1)	−0.002 (0.057)	0.188*** (0.052)	0.097 (0.083)	0.290*** (0.084)	0.159** (0.076)	0.330*** (0.105)
Mean # of additional children	1.065	1.812	1.368	1.973	0.741	1.655
Std. Dev.	0.929	1.199	0.775	1.029	0.973	1.331
N	236	236	115	115	121	121
R-squared	0.000	0.040	0.020	0.101	0.034	0.078

Notes: “Number of Additional Children” denotes the number of children born after the first survey round. We report results from the following regressions: $f_{i,t} - f_{i,1} = \alpha + \beta(x_{i,1} - f_{i,1}) + \epsilon$ for $t = 2,3$. The sample comprises all women in the analysis sample who were interviewed in Rounds 1, 2 and 3. Two out of the 239 women gave non-numeric answers to the question on fertility desires, and one woman is missing information on actual fertility for Round 1, leaving a sample size of 236. 115 of these women had been pregnant at least once by Round 1 (Pregnancies > 0 (Rd 1)), 121 had not (Never Pregnant (Rd 1)), totalling the sample sizes in the middle and right panels respectively. Each column represents a separate regression. Regressions include no additional controls. Standard errors (in parenthesis) are clustered at the baseline school level. Stars indicate the following significance levels

*
p < 0.1

**
p < 0.05 and

***
p < 0.01. Observations are weighted using survey weights from the later round, adjusted for the two-stage tracking design of the KLPS. Rows “Mean” and “Std. Dev.” show these respective measures for the number of additional children between Round 1 and later rounds.