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Publication Date

2022

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Essays on Big Life Decisions

by

Maximilian W. Müller

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Economics

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Stefano DellaVigna, Chair

Professor Ned Augenblick

Professor Edward Miguel

Professor Dmitry Taubinsky

Spring 2022

Essays on Big Life Decisions

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Abstract

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Professor Stefano DellaVigna, Chair

How do people make big life decisions such as career or fertility choices? Big life decisions such as these are crucial determinants of individual life outcomes and together also drive many societal outcomes such as social mobility or population growth. In this dissertation, I therefore ask: how do people make big life decisions and how might they impact outcomes at the societal level? I start by asking the following question: how stable are preferences with respect to big life decisions?

In the first chapter, co-authored with Joan Hamory, Jennifer Johnson-Hanks, and Edward Miguel, we therefore investigate the stability of Kenyans' fertility preferences over 9 years. Using a sample of 351 Kenyan women, we find that most of them change their desired fertility over time. Over a time horizon of 9 years, 63% of women changed their desired fertility by at least one child, and 20% changed their desired fertility by two or more children. While desires are unstable, respondents perceive their desires to be stable, both in anticipation and in their memory. They underestimate how much their desires will change in the future and especially underestimate increases in their desired fertility. They also overestimate how stable their desires have been in the past, and strongly underestimate past increases in their fertility desires. The findings demonstrate that even for important life domains, desires are subject to considerable change over time. This raises the question of how these preferences initially form and what factors shape them over time.

In the second chapter, I examine how educational aspirations are transmitted within families and whether parental influence contributes to the socio-economic gap in college attendance. In Germany, high school graduates who lack parents with college experience are 40 percentage points less likely to attend college than those with

college-educated parents, despite college being free. This chapter provides evidence that parental influence explains a significant portion of this gap through at least two channels: one, parental pressure and two, the intergenerational transmission of beliefs and preferences. To understand parental influence, I conduct a field experiment with 1,195 students and 819 parents in Germany. I experimentally make students' stated college plans visible to parents, which doubles the socio-economic gap in college plans to 27 percentage points. This is mainly driven by a large increase in college plans among students with college-educated parents. To disentangle mechanisms, I collect detailed survey data on students' and parents' subjective expectations for various career tracks and estimate a structural model of career choice under uncertainty. Model simulations indicate that 40% of the socio-economic gap in college plans is explained by parental pressure and 44% by students internalizing family-specific beliefs. A crucial follow-up question is when is parental influence good and when is it bad? One aspect that matters for answering this complex question is what informs parents' preferences and beliefs.

I take a first step at addressing this question in the third chapter, by analyzing how people learn from important personal experiences and showing that motivated memory biases influence how life outcomes shape preferences and beliefs. I design randomized experiments around memory and embed them in a panel tracking fertility preferences and actual fertility for 3,928 Kenyans over a decade from their early twenties to their thirties. Using data on respondents' actual past fertility desires, I provide experimental incentives to remember and to be reminded of past desires. I report five results. First, 30% of respondents have more children by their thirties than once desired. Second, respondents are systematically biased in recalling past fertility desires – they mis-remember past desired fertility in the direction of current fertility. Third, financial incentives improve memory of neutral questions like Kenya's past vice-president. For those who do not have more children than once desired they also improve memory of past fertility desires. However, financial incentives do not improve memory of past fertility desires for those with more children than once desired, suggesting selective forgetting is deliberate and motivated. Consistent with motivated memory, and my fourth finding, respondents with more children than once desired forego money to avoid information about their past desires. Fifth, motivated memory affects what preferences respondents pass on to the next generation. Parents' advice to the next generation may thus be shaped by other concerns than their children's well-being. The influence family and parents have on individual and societal outcomes thus warrants more work on the different forms this influence can take and their welfare implications.

*To those who inspired this research,
and to those who may one day benefit from it.
And to the hope that there will be people in the latter group.*

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Acknowledgments

It's been a fantastic journey and I am grateful for all those who were part of it. I especially thank my advisors and dissertation committee. A PhD is a long and intense academic apprenticeship and I am grateful that I was able to learn some of the craft from you. I benefited so much from your advice and example over all these years. I know I won't be able to pay it back, but I hope to pay it forward. Thank you, Stefano, for your advice and support all these years from 219B to the market and beyond, for your patience and guidance on which ideas to pursue and when to keep exploring, and your dedication to our behavioral group here at Berkeley. Thank you, Ted, for your continuous encouragement and unwavering support, especially for what is now chapter 3. This wouldn't have been possible without your generous support. Thank you, Dmitry, for your support, advice, and honest feedback on my ideas, presentations, and writing all the way from 219A to now, and for always taking the time to discuss these things, even on Friday afternoons. And thank you, Ned, for taking the time to go into the details of research questions, designs, pitches, and for teaching me that the job market is all about answering 5 key questions and helping shape my answers to these.

I have greatly benefited from conversations with so many more faculty and fellow grad students over these years that listing all of them would take up pages of its own. Thank you so much for your time and thoughts, I hope there will be plenty opportunity for more conversations in the future. A special thanks also goes to my academic home, the "behavioral (or psych & econ) therapy" group, for all their feedback on my research ideas (no matter how early stage), for sharing their ideas and work at all stages, and for also providing advice outside our weekly sessions. Thank you to everyone at the DICE for welcoming me for the duration of fieldwork, especially Mats Köster and Hannah Schildberg-Hörisch. I thank my co-authors Joan Hamory, Jennifer Johnson-Hanks, and Ted Miguel, for collaborating on what turned into chapter 1.

A big thank you to the Econ department and its exceptional atmosphere. I am grateful that the prevailing culture among students and faculty has always been supportive. Thank you to all faculty, staff, and graduate students that have contributed to this welcoming culture. Getting to know you over these years has been one of the highlights of my PhD. It's inspiring what ideas, research, and scholars are "produced" in this department. Thank you to Martha Olney for caring so much about teaching and mentoring and helping us become better teachers and mentors ourselves. To my cohort, thank you for surviving first year together and for staying in touch. I

can't wait to follow everything you'll be up to. To my office mates, Christina Brown, Isabelle Cohen, Junyi Hou, Eric Hsu, and Sam Leone, thank you for brightening up our office without windows. And to the volleyball team, for providing team spirit across cohorts and for sweet victories in the Little Big Game.

Thank you to the community of International House, where I have spent the first four years of my PhD. You have been my "home away from home" and the best community I could have asked for. You have been my commitment device to take time off and a huge part in enjoying my life at Berkeley as much as I did. I truly appreciate all the long dinner conversations and the friendships that have formed. You have been an inspiration for how enjoyable living together under one roof can be. You even provided me with research ideas and at least one co-author for now, special shout-out to Kwabena Donkor at this point. Thank you to everyone who was part of my time at I-House.

Last but not least, a big thank you to my family. My parents for always supporting me, no matter how far from home my path took me or what I decided I wanted to do. I am deeply grateful for your unconditional love, for the freedom to pursue my own paths, and for your never-ending interest in what I do. I am glad that I could dig out my own path without any particular pressure from you. My sister for always being there, for advising and supporting your "little" brother, for visiting, and for exploring this world together.

Funding for chapters of this dissertation was provided by the Joachim Herz Foundation and the xlab at UC Berkeley, thank you for your trust. And finally, thank you to everyone who participated in the research projects for this dissertation and to those who helped make these projects possible.

Chapter 1

The illusion of stable fertility preferences

1.1 Introduction

One of the most central and persistent questions in population science concerns when, how, and why fertility changes (Caldwell, Orubuloye and Caldwell (1992); Coale (1973); Davis and Blake (1956); Lee (1980)). While contemporary research on rich countries focuses largely on below-replacement fertility (Balbo, Billari and Mills (2013); Morgan and Taylor (2006)), persistently high fertility in Sub-Saharan Africa also remains a central topic of scholarship (Moultrie, Sayi and Timæus (2012); Shapiro and Gebreselassie (2008)). 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 (Becker (2009); Schultz (1997)); others argue that intentions are instead the product of social norms and cultural values, which can diffuse within and potentially across communities (Watkins (1990, 2000); Casterline (2001)). The debate between these two positions has long been heated (see discussions in Alter (1992); Hirschman (1994); Mason (1997); Pollak and Watkins (1993)). 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.¹ 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 prospecting 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 retrospective measures – in more detail (Jain et al. (2014), Bankole and Westoff (1998), Koenig et al. (2006), 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.

¹See for example: Agadjanian (2005); Bachrach and Morgan (2013); Bhrolcháin and Beaujouan (2019); Günther and Harttgen (2016); Hanappi et al. (2017); Hartnett (2014); Hayford and Morgan (2008); Iacovou and Tavares (2011); Johnson-Hanks (2005, 2007); Marteleto et al. (2017); Miller, Barber and Gatny (2013); Rossier and Bernardi (2009); Sennott and Yeatman (2012); Testa and Basten (2014); Trinitapoli and Yeatman (2011).

Reproductive outcomes, therefore, are best seen as the products of context.

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.² 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

²For example: Bankole and Westoff (1998); Bongaarts (1992); Campbell and Campbell (1997); De Silva (1992); Jones, Paul and Westoff (1980); Miller and Pasta (1995); Morgan (1981, 1982); Nair and Chow (1980); Quesnel-Vallée and Morgan (2003); Schoen et al. (1999, 2000); Symeonidou (2000); Tan and Tey (1994); Vlassoff (1990); Trinitapoli and Yeatman (2018); Hayford and Agadjanian (2017). See Cleland, Machiyama and Casterline (2020) for a review of this literature for Africa and Asia.

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 Bhrolcháin 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 prospecting and retrospection, as well as a detailed set of data about social, economic, household, educational, and health factors over nearly a decade.

1.2 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.³ 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-

³Data from the KLPS project, and the data used for this paper, is accessible online via Harvard's Dataverse: <https://dataverse.harvard.edu/>.

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.⁴ 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 et al. (2016) and Baird, Hamory and Miguel (2008).⁵ 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

⁴The initial survey questions are drafted in English, then translated and adjusted to fit the context by the local survey team, before being backtranslated to ensure the original intent of the question has been preserved. Before the start of each survey round, all survey questions are intensively tested and adjusted using a local pilot sample (that does not participate in the main survey round).

⁵We follow the procedure also used for the U.S. Moving to Opportunity study (see Kling, Liebman and Katz (2007)).

given the context, sample and the long time horizon.⁶

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. Ac-

⁶The effective tracking rate (ETR) is calculated in the following way using the regular phase tracking rate (RTR) and the intensive phase tracking rate (ITR): $ETR = RTR + (1 - RTR) * ITR$

tual fertility, i.e., the number of children born and alive by time t , are indicated by $f_{i,t}$. Recall of past fertility desires for time $t - j$ as collected at time t is denoted as $x_{i,t-j|t}^R$.

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 time-frames (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 1.1 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 24.⁷ We proceed by showing the joint distribution of reproductive desires across survey rounds for women in our analysis sample in Figure 1.2, 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

⁷Women 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 are dropped. 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.

women in our extended sample between KLPS Rounds 2 and 3 (see Figure A.1). 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 1.3, 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 1.3 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.⁸

⁸The full list of scenarios is the following: Finances improve; Finances worsen; Husband wants more children; Left alone with husband (co-wife leaves); Marry soon; Husband takes another wife; Co-wife has many children; Become a junior co-wife; No longer get along with spouse; Unable to find husband; Child fostered away; All children are female; All children are male; A child dies in infancy; Receive a teen foster child; Receive 3 young foster children; Pregnancies are difficult;

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 1.4). 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)?”⁹ 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.¹⁰ 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 1.4, 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.

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.

1.3 Results

In all three rounds, over 90% of the women in our analysis sample report between 2 and 5 desired children (see Figure A.2a for the full distributions), and the av-

Daughter in law gives birth; Daughter gives birth. Note that 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.

⁹Not 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, which we take as evidence that this imprecision in the question is not driving the results.

¹⁰Formally, respondents correctly recall the direction into which they changed their desires if $sgn(x_2 - \hat{x}_{1|2}^R) = sgn(x_2 - x_1)$.

erage 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.3). 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 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. Furthermore, 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. These look very much like the abstract, socially constructed ideals that Bhrolcháin 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 1.1). 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-Vallée 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.3), 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.2a).¹¹ 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 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, 26.3% have decreasing desires across rounds, and 24.8% have increasing desires. (12% of respondents do not fit neatly into this classification, refer to table A.1 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.¹² 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.1 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

¹¹These results 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.

¹²The 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 $x_3 \geq x_2 \geq x_1$).

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).¹³ 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 1.3 for results).¹⁴ 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:

¹³These 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.

¹⁴Since 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.

30% (60%) of women not expecting to have a child in the next 2 (5) years ended up having one (see Appendix Table A.2 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 1.3, 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.¹⁵ 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 1.3 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

¹⁵A 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.

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.¹⁶

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 1.4). 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 1.4 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

¹⁶Note that 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.

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.

1.4 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 lifecourse. 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, Cooper and Pratten (2014); Johnson-Hanks (2006); Whyte (1997)).

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 Bhrolcháin 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.¹⁷ 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

¹⁷Our 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).

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.

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).¹⁸ 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.6). 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.7).

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. Rackin and Morgan (2018); Smith-Greenaway and Sennott (2016)). 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.¹⁹ 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

¹⁸As shown in Figure A.5, this recall behavior causes “recalled” excess fertility to be much lower than excess fertility when measured using respondents actual past desires.

¹⁹The 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.

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.

1.5 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 Bhrolcháin 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 chapter, 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.

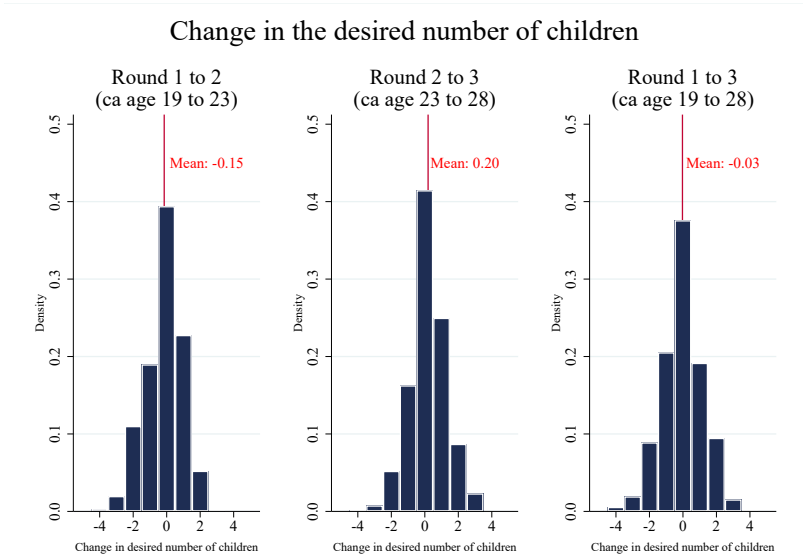
Despite these asymmetric expectations, large shares of respondents have both upward and downward changes in stated desired fertility between ages 18 and 28. For example, while around 27% (24%) of women expect their desired fertility to increase in the case in which all children end up being girls (boys), 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.

1.6 Figures

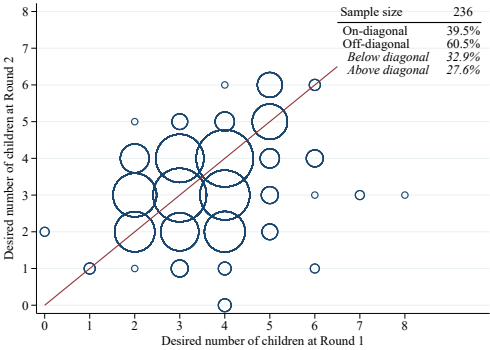
Figure 1.1: Distribution of changes in desired children between survey rounds



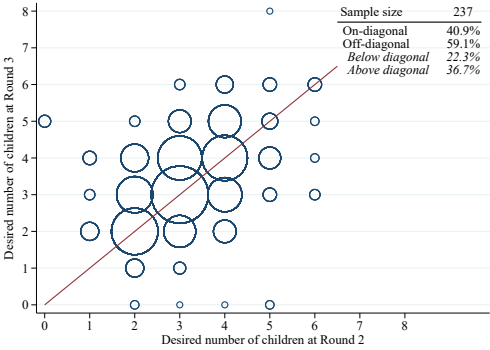
Notes: This figure plots the distribution of changes in fertility desires between KLPS survey Rounds 1 and 2 ($x_2 - x_1$), Rounds 2 and 3 ($x_3 - x_2$) and Rounds 1 to 3 ($x_3 - x_1$) for the 239 women of the analysis sample who were interviewed in all three survey rounds. Women who gave non-numerical 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 between rounds, with -0.146 between round 1 and 2, +0.196 between round 2 and 3, -0.029 between round 1 and 3.

Figure 1.2: Distribution of desired number of children across survey rounds

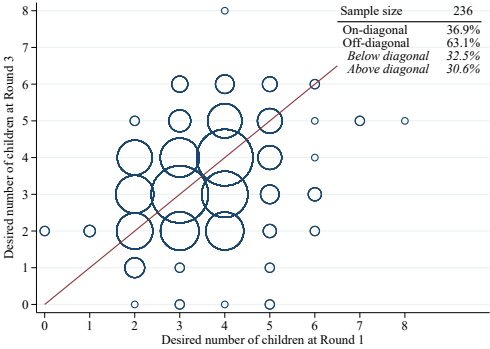
(a) Desired Number of Children in Rounds 1 and 2



(b) Desired Number of Children in Rounds 2 and 3

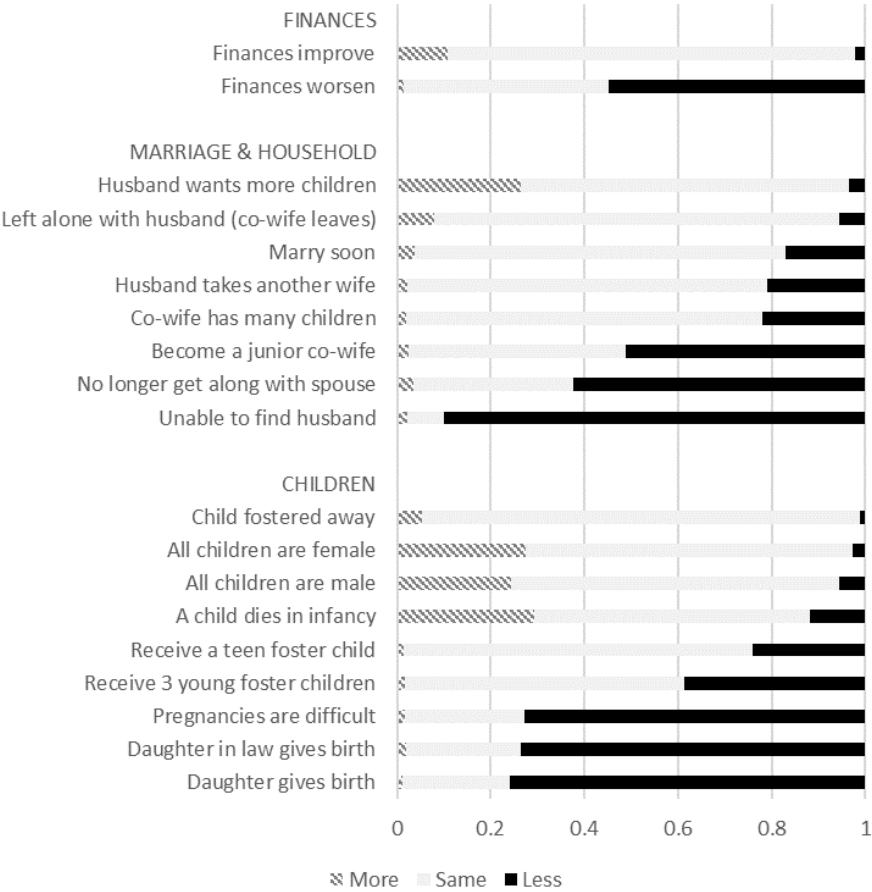


(c) Desired Number of Children in Rounds 1 and 3



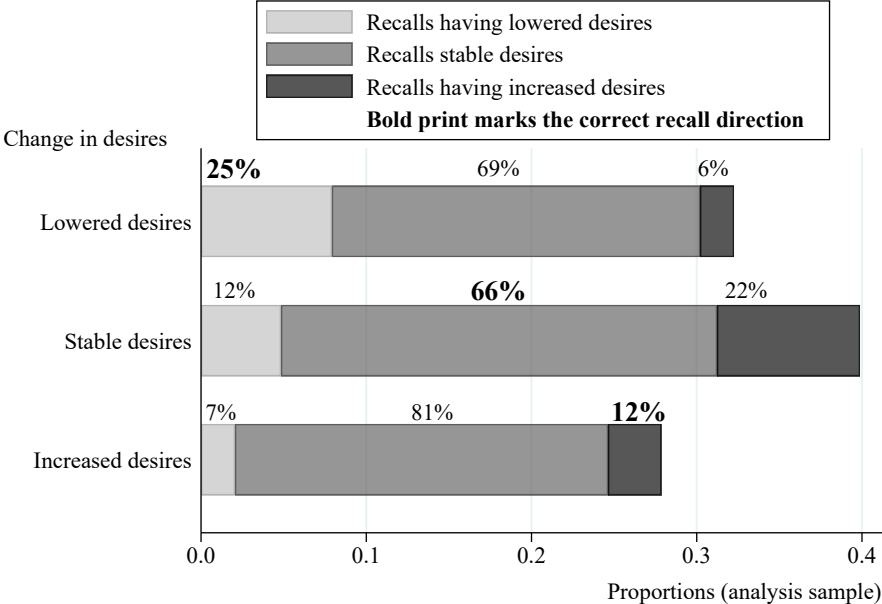
Notes: These figures show the shares of respondents in the analysis sample who were interviewed in all three survey rounds for each combination of desired children in Rounds 1 and 2, 2 and 3 and 1 and 3 (as long as the number of desired children is 8 or lower in both survey rounds). The size of the bubbles 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.1.

Figure 1.3: 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 1.4: Recall patterns: Recalled Direction of Change in Desires (x-axis) at Round 2 conditional on Direction of Change in Fertility Desires between Round 1 and Round 2 (y-axis)



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 $\hat{x}_{1|2}^R < x_2$ (i.e. if she recalls a higher desire than she currently reports), having had stable desires if $\hat{x}_{1|2}^R = x_2$ (i.e. if she recalls the same desired fertility as she stated in round 2) and having increased desires if $\hat{x}_{1|2}^R > x_2$ (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. $x_1 < x_2$). The x-axis indicates how many women have lower, equal or increased desires 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.

1.7 Tables

Table 1.1: Survey timing & data availability

		Round 1 (2003 - 2005)	Round 2 (2007 - 2009)	Round 3 (2011 - 2014)
Analysis	# Respondents	351	277	283
sample	Median Age	19	23	28
	Data Availability			
	Desires (x_t)	✓	✓	✓
	Recall ($x_{t-1 t}^R$)	-	✓	-
	Living Children (f_t)	✓	✓	✓
Extended	# Female Respondents	2,343	2,506	2,575
sample	Median Age	18	22	26
	Data Availability			
	Desires (x_t)	-	✓	✓
	Recall ($x_{t-1 t}^R$)	-	✓	-
	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 1.2: Summary statistics

Round	Women					
	Analysis sample			Extended sample		
	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 1.3: Reproductive desires (for additional children) and outcomes

	<i>Dep. Var.:</i> 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)	
Desires	-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	1.068	1.815	1.368	1.973	0.745	1.659
Std. Dev.	0.928	1.200	0.775	1.029	0.974	1.334
N	236	236	115	115	121	121
R-squared	0.000	0.040	0.020	0.102	0.034	0.078

Notes: “Desires” denotes the number of *additional children desired*, while “Number of Additional Children” denotes the number of children born after the first survey round. We report results from the following regressions: $f_{i,t} - f_{i,1} = \alpha + \beta(x_{i,1} - f_{i,1}) + \epsilon_i$ 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.

Chapter 2

Intergenerational Transmission of Education: Internalized Aspirations versus Parent Pressure

2.1 Introduction

In many countries, people's career paths are strongly associated with their parental background (Black and Devereux, 2011; Chetty et al., 2014; Schnitzlein, 2016; Long and Ferrie, 2013). For example, in Germany high school graduates whose parents did not attend college themselves are 40 percentage points less likely to attend college than children with college-educated parents. Differences in financial constraints or expected earnings cannot fully explain the observed socio-economic gaps (Heckman, Lochner and Todd, 2006).

A recent and rapidly growing literature has thus examined alternative explanations. Studies have focused on the role of informational constraints (Dynarski et al., 2021; Gurantz et al., 2021), neighborhoods or schools (Chetty and Hendren, 2018; Rothstein, 2019; Biasi, 2019) and students' preferences and beliefs regarding career tracks (Boneva and Rauh, 2017). This paper focuses on a novel mechanism: parental pressure. While there is correlational evidence that parental approval matters for gaps in career choices (Boneva and Rauh, 2017; Zafar, 2013), causal evidence for the impact of parental pressure is lacking.

This paper studies how high school students in Germany adjust career choices beyond their own preferences and beliefs to more closely match their parents' preferences and how this impacts the socio-economic gap in college plans. To study this question, I designed a field experiment in which I varied whether students' stated ca-

reer plans for potential advising sessions were shared with their parents or not. This experimental variation identifies the causal effect of increasing parental pressure on students' career plans. To put this adjustment into context, I estimate a structural model that also accounts for students' beliefs and preferences. This allows me to quantify the predicted contribution of parental pressure to the socio-economic gap in college plans relative to these internalized components.

Germany is a well-suited context in which to study the influence of parents' preferences on students' career choices. Primary, secondary, and tertiary education is free, and college attendance strongly depends on parental background. Of children with at least one college-educated parent 79% enroll in college, but only 27% of those without a college-educated parent do so. Among high school graduates, the gap stands at 87% vs. 47% – this gap is the focus of this paper.

I begin with documenting a strong association between parents' preferences and students' career choices, using the National Educational Panel Survey (NEPS) that tracks German students from high school to postsecondary education. The data shows that among the 18% of students who initially disagreed with their parents on attending college or not, 51% choose to follow their parents' aspirations rather than their own. Since this could be due to a number of other factors such as students becoming more informed over time, it does not imply that students adjust their choices to accommodate their parents' preferences, however.

To study the causal impact of parent pressure, I designed a field experiment about career planning in which 1,195 students and 819 parents participate. I developed an extensive career planning module of up to 150 minutes that embedded standardized career advising tests and career planning surveys into students' career planning curriculum. I then invited students and parents at 47 high schools to participate. To make the elicitation of career plans incentive-compatible, I coupled the elicitation with a lottery of expensive career advising sessions and informed students that their stated plans determine what type of advising session they get. I experimentally varied parent pressure by randomizing the instructions to students between a *private* and a *public* condition. While I informed all students that I would send them a copy of their answers for their further preparation, I randomized whether I would also send a copy to their parents at the individual level.

I find that students' adjustment to parental pressure and their subjective expectations regarding different career tracks explain most of the observed socio-economic gap in college plans. Following convention, I define students with at least one college-educated parent as “high socio-economic status” students (henceforth “high SES”). Students without any college-educated parent are defined as “low SES” students. Students adjust their college aspirations when those aspirations are observable by parents, which widens the socio-economic gap significantly. In the *private* condition,

there is a socio-economic gap of 12 percentage points in college aspirations; 68% of high SES and 56% of low SES students aspire to attend college. In the *public* condition, high SES students are 10 percentage points more likely, but low SES students 5 percentage points less likely to aspire to college. Consequently, the socio-economic gap in college aspirations more than doubles to 27 percentage points in the *public* condition.

Among the high SES students, there is a larger effect for those with one rather than two college-educated parents. Students with one college-educated parent are 15 percentage points more likely to aspire to college in the *public* than the *private* condition. In *private*, these students' college aspirations are in line with their parent without college education, whereas in *public*, they align with their college-educated parent. Some of these students therefore plan to attend college only due to perceived expectations to do so by their college-educated parent. In contrast, among those with two college-educated parents, 80% already aspire to college in the *private* condition. They appear to have mostly internalized college as the preferred option. This could explain why for them there is no significant difference in college plans between the *private* and the *public* condition.

Students' adjustment to parents' preferences is not limited to college aspirations. When aspirations are shared with parents, students also adjust their preferred fields towards those preferred by parents: they become more likely to aspire to high-earning fields such as business and economics and less likely to aspire to low-earning fields such as arts, music, and design. This is again most pronounced for students with college-educated parents.

To decompose the socio-economic gap of 27 percentage points in observable college aspirations, I estimate a structural choice model of career plans building on Boneva and Rauh (2017), Zafar (2013), and Giustinelli (2016). For this purpose, I also elicited students' subjective expectations ("beliefs") with respect to undergraduate studies, dual study programs, and vocational training. The model can explain 89% of the observed socio-economic gap. In the model, 44% of the predicted gap is due to students' adjustment to parental pressure and 56% due to differences in students' beliefs and preferences. I find a strong association between parents' and children's beliefs, which is consistent with a possible intergenerational transmission of these beliefs.

These results imply that parents' preferences and beliefs shape students' educational choices in two major ways. First, students may adopt their parents' beliefs and preferences. Second, they adjust their educational choices to their parents' preferences beyond any internalized aspects. Since parents' own beliefs and preferences are favorable to careers similar to their own, both channels of transmission reduce intergenerational mobility.

The impact of parental pressure relative to students' own preferences and beliefs is heterogeneous. While internalized beliefs and preferences predict 78% of the gap between low SES students and those with two college-educated parents, differential parental pressure predicts 78% of the gap between low SES students and those with one college-educated parent. At the individual level, students who do not have positive expectations for college appear to adjust the most to parental pressure. These are predominantly students who have low grades. I also find suggestive evidence that girls and agreeable students¹ appear especially likely to adjust their aspirations in the *public* condition. Both perceiving a reason to adjust, such as potential disagreement with parents, and being willing to adjust thus seem to be crucial factors behind heterogeneities in reacting to increased pressure in the *public* condition.

I contribute to several literatures by testing and empirically quantifying the role of parent pressure as a mechanism behind intergenerational mobility. First, my paper contributes to the literature on reasons behind socio-economic gaps in career outcomes and ways to address these gaps. Many papers document intergenerational correlations in education, earnings, and occupations² and examine the reasons behind this strong relationship. I find that students' adjustment to parental pressure widens the socio-economic gap in college plans. Importantly, the gap widens within schools, on top of differences in students' preferences and beliefs, and while holding informational, financial, and eligibility constraints fixed. The mechanism is thus different from financial or informational constraints,³ differences in schools or neighborhoods,⁴ or students' internal preferences and beliefs with respect to career tracks.⁵

My paper also relates to the literature on the drivers of career and educational choices, in particular to two separate branches on social influences and the role of subjective beliefs. I make a methodological contribution by showing how to study these two jointly rather than in separation. Studying both aspects in a unified framework, I can quantify their relative importance and how they interact. In addition, I

¹Agreeableness is one of the five personality traits measured in the Big Five Inventory (Soto and John, 2017) and associated with a heightened desire for harmony and social approval. I classify students as "agreeable" if they score above the median for agreeableness on the Big Five Inventory.

²See Black and Devereux (2011); Chetty et al. (2014); Schnitzlein (2016); Findeisen et al. (2021).

³On the role of credit constraints, see for example Heckman, Lochner and Todd (2006); Keane and Wolpin (2001); Carneiro and Heckman (2002); Cunha et al. (2006); Belley and Lochner (2007); Lochner and Monge-Naranjo (2012). For papers exploring informational constraints, refer to Dynarski et al. (2021); Peter, Spiess and Zambre (2021); Lergetporer, Werner and Woessmann (2021); Bleemer and Zafar (2018); Gurantz et al. (2021); Hoxby and Turner (2013).

⁴See Chetty, Hendren and Katz (2016); Chetty and Hendren (2018); Rothstein (2019); Biasi (2019).

⁵See for example Boneva and Rauh (2017); Belfield et al. (2020); Boneva, Golin and Rauh (2021); Ehrmantraut, Pinger and Stans (2020).

contribute to each of the two literatures separately. I add to the literature on social influence by showing that educational choices also serve as signals to parents, not just to peers, (potential) partners, or prospective employers.⁶ I contribute to the literature on subjective beliefs in educational choices by confirming the importance of beliefs in a new context and by demonstrating a strong correlation between students' and parents' beliefs.⁷ Previous papers in this literature assumed that students' and parents' beliefs are closely linked. The evidence for family-specific beliefs in this paper is consistent with beliefs having been transmitted from parents to children, and thus also adds to research on intergenerational transmission within families more broadly.⁸

Students' reactions to disagreements with their parents illustrates that intergenerational transmission involves two active parties, parents and children. This complements a growing literature on intergenerational intra-household decision-making by showing how parents shape their children's choices when parents are not the sole decision-maker.⁹ The paper demonstrates that parents' preferences continue to matter for students' choices beyond high school. The transition from parents as sole decision-maker, as in childhood,¹⁰ to students deciding by themselves may thus be much more gradual than often implicitly assumed by treating students as sole decision-makers of postsecondary choices.

The remainder of the paper is structured as follows: I start with an introduction to the setting of choosing tracks after high school in Germany. Using NEPS data, I next show that students often follow their parents' aspirations. Third, I present my field experiment and its findings. Fourth, I introduce detailed data on students' beliefs and estimate a choice model to benchmark students' adjustment to parents against the predictive power of students' preferences and beliefs. I close with heterogeneities in adjusting to parents and conclude.

⁶For signalling to peers, refer to Bursztyn and Jensen (2015), Bursztyn, Egorov and Jensen (2017), and Fryer Jr and Torelli (2010); for signalling to (potential) partners to Bursztyn, Fujiwara and Pallais (2017) and Spence et al. (1973) for the seminal paper on signalling (to employers).

⁷Among others, see Jensen (2010), Attanasio and Kaufmann (2017), Zafar (2013), Boneva and Rauh (2017), Stinebrickner and Stinebrickner (2013), Wiswall and Zafar (2015), Delavande and Zafar (2019), Cortés et al. (2021), Arcidiacono, Hotz and Kang (2012); Arcidiacono et al. (2020), Hastings, Neilson and Zimmerman (2015); Hastings et al. (2016), Giustinelli and Manski (2018).

⁸Papers in this literature include, among others: Bisin and Verdier (2001, 2011), Dohmen et al. (2011), Doepke and Zilibotti (2017), Fernández and Fogli (2006, 2009).

⁹See Bursztyn and Coffman (2012); Dizon-Ross (2018); Ashraf et al. (2018); Boneva and Rauh (2017); Bergman (2015); Giustinelli (2016); Giustinelli and Manski (2018); Jensen and Miller (2017).

¹⁰See Currie and Almond (2011) or Cunha et al. (2006) for example.

2.2 Postsecondary Career Choices in Germany

Germany offers a well-suited context to examine the importance of students' and parents' preferences behind the socio-economic gap in college attendance and career choices more generally. This is for two main reasons. First, college attendance in Germany strongly depends on students' socio-economic background. Among those who obtained an university entry qualification (the *Abitur*), 87% of children with at least one college-educated parent choose to attend college, but only 47% of those without any college-educated parent do.¹¹ This is a large gap considering that students with the university entry qualification present a selected sample. Second, education is tuition-free from primary school to university and the entry to many (university) programs is not very competitive. Preferences should thus be important drivers of whether and what to study. Following, I present more details on the relevant aspects of the German education system and the transition from high school to postsecondary careers.

Socio-economic gaps in educational transitions

While 79% of high SES students eventually attend college, only 27% of low SES students do so. Among those graduating from high school, the shares are 87% vs. 47%. This socio-economic gap of 40 percentage points is the one I examine in this paper.

The sample of high school graduates already is a selective sample itself, because selection in Germany starts much earlier with the transition from elementary to secondary schools. One of the available secondary tracks leads to the upper classes and the *Abitur*. It is available at two types of schools, the *Gymnasium* and the *Gesamtschule*. In North Rhine-Westphalia, and most of Germany, this early tracking happens after 4 years of primary school. A proxy for the social selectivity of this transition is the share of students from different parental background that makes it to the upper classes in high school. While it is 83% among high SES families, it is only 46% for low SES families. This selection is strongly driven by tracking after 4 years of primary school, where parents have been found to play an important role.¹²

There is an equivalently pronounced socio-economic gap among high school graduates. This gap is not exclusively driven by differences in students' grade averages or cognitive scores, as the gap is similarly pronounced when controlling for students'

¹¹See Federal Ministry of Education and Research (2016)

¹²Falk, Kosse and Pinger (2020) examine the effect of mentoring on the gap in early tracking.

grade average or cognitive score.¹³ What alternative explanations may account for the pronounced gap? And what exact role do parents play at this stage given that most students are adults when they get to choose postsecondary careers?

Understanding the reasons behind the socio-economic gap in the transition from high school to university is relevant for understanding the reasons behind the overall gap in university attendance. If low SES high school graduates were to enrol at university at the same rate as their high SES peers, the overall gap in university attendance would close by 19 percentage points or 36.5% of the gap. Vice versa it would close by 33 percentage points, or 64.7% of the gap.¹⁴ These gaps are all conditional on parents' educational background, which raises the question what role parents play in their children's complex career choices at this point in their lives. Financial resources are a natural starting point.

Paying for education in Germany

Education from primary school to university is state-financed in Germany and free for individual students. The exception are university fees of between \$100 and \$400 per semester. This can be higher for private universities, but less than 10% of students attend private universities.¹⁵ Similarly, for elementary school and high school, 92% of all students attend publicly-funded schools (Statistisches Bundesamt, 2020). One of the motivations for the publicly-funded education system is that children from all backgrounds should have the same opportunities and should not be held back by a lack of personal financial resources. This is also the rationale for financial support through the *German Federal Training Assistance Act* (or BAföG) which was designed to enable “young men and women to choose the training that suits their personal interests, irrespective of their families' financial means”.¹⁶ It is available to students from 10th grade on. Most recipients use it for their living expenses during vocational training or college. Almost 20% of students receive some monthly payment through

¹³Using the NEPS, the socio-economic gap does not close when controlling for grade average- or cognitive score-fixed effects. Results are presented in tables B.2 and B.4.

¹⁴The statistics are from 2016 data provided by the Federal Ministry of Education and Research (2016). 83% of high SES students make it to upper classes at high school and 87% of these go on to college. These shares are 46% and 47% for low SES students, resulting in 72% vs. 21% enrolling in university via high school. Students can also make it to university via professional schools. These are attended by 17% of high SES and 54% of low SES children, among whom 40% and 10% go on to university. This brings the overall gap in college enrollment to 79% vs. 27%. The calculations above are based on the path via high school.

¹⁵Among 2.9 million students in Germany in 2019/20 (Statistisches Bundesamt, 2021b), 269,000 attended private institutions (Statistisches Bundesamt, 2021a).

¹⁶More information is provided by the Federal Ministry of Education and Research (2021).

BAföG, with the exact amount depending on parents' financial means among others. The maximum monthly payment is €861 and the average monthly payment €500. Half of the payments are given as a grant and half of them as an interest-free loan. The maximum amount that needs to be repaid is €10,010.

Despite the low costs of most paths and additional government-provided financial support there remains a strong relationship between students' educational careers and parental background. How do students' choices come about if financial resources alone cannot explain the persisting gaps?

Choosing a postsecondary educational career

In order to obtain a university qualification, students have to attend 3 years of upper classes at high school.¹⁷ After graduating from high school, they can choose from many options. Their decision can be broken down into three major components: broad tracks, fields/occupations and universities/employers. They can choose between 4 broad tracks: attend university, sign up for a dual study program, pursue vocational training or start to work without further education.¹⁸ Most graduates choose one of the first three options, with studying at a university being most popular. Around 63% of graduates attend college, another 5% take up a dual study program and 30% opt for vocational training.¹⁹ At a more detailed level, graduates have to decide in which area to specialize: picking a major when planning to study or an occupation when planning to pursue vocational training. Finally, students have to choose a university or an employer. Preferences for locations or one's general willingness to move thus play an important role in determining one's choice set of universities and employers. While for dual study programs and vocational training students usually have to apply during their last year at school, for most college programs they can wait until after graduation (typical application deadlines are provided in figure 2.3).

The exact application process depends on the preferred major and university. As long as demand does not outstrip supply of places for this major at the preferred university, students can simply enrol with their college entry qualification. Entry to

¹⁷Their performance during their last two years determines 50% of their final grade average, with the remaining half determined by one oral examination and three state-wide written exams.

¹⁸Dual study programs combine elements of practical training in a specific firm with college-level courses.

¹⁹These numbers are based on decisions and concrete plans by graduates in North Rhine-Westphalia half a year after graduation in 2012, available in Appendix tables by Schneider and Franke (2014), Deutsches Zentrum für Hochschul- und Wissenschaftsforschung (DZHW), and Kracke, Buck and Middendorff (2018).

about 60% of programs is unrestricted in this way. For other programs, students have to apply in July, to a specific field at a specific university.²⁰ Next, students pick the program they prefer among those that admitted them. For majors with competitive entry at a specific university there are often less competitive alternatives, which increases students' chance to pursue a major close to their interest. Substitutes for a specific program in Business Administration would for example be a program in Business Administration at another university or Economics at the same university. Once students are enrolled, switching majors requires to re-apply to an alternative program, drop out and then start from scratch. Choosing a postsecondary career path among the many available options is thus both consequential and complex.

2.3 Motivating Descriptive Evidence

Using a panel study that tracks German high school students from high school to the 3 years after graduation, I provide three empirical findings suggesting that parents' preferences play a big role in students' career choices. First, both students and parents show an increased tendency to prefer college the more college-educated parents are in the family, a relationship even more pronounced for parents than for students. Second, when regressing students' actual college attendance within 2.5 years of graduating on students' and parents' aspirations, both are important inputs for predicting students' attendance. Third, when students and parents disagree about whether to attend college or not, more than 50% of students follow their parents' aspiration rather than their own.

Data

The German National Educational Panel Survey (NEPS) tracks students from high school grade 9 through to almost 3 years after graduation. It combines surveys of students and parents and contains detailed information on the educational career of students, including data on aspirations for the future. In grades 11 and 12, for almost 3,000 students, students and parents were asked whether they aspire to attend college after high school. I combine these aspirations with data on actual college enrolment.

²⁰The application process for fields like medical studies and psychology is more restricted and centralized since demand for places is generally higher than supply.

Findings

Almost 82% of students hold aspirations in line with their parents' aspirations and ca. 80% end up following these aspirations. But even among students disagreeing with their parents' aspirations, around 50% follow their parents' aspiration rather than their own. When a parent prefers college but the child does not, almost 60% of students end up attending college (see figure 2.1). A similar share eventually attends college if the child does aspire to college but the surveyed parent does not, although the non-surveyed parent might do so. These patterns imply that parents' college aspiration is a significant predictor of students' college attendance. In a linear probability model, reported in table B.1, a parent preferring college for their child is associated with a 35 percentage point increase in the student's probability to attend college, similar to the 34 percentage point association with students' aspiration.

Interpretation

The evidence from the NEPS shows that parents' career preferences are predictive of students' college attendance, beyond students' own aspirations. Even when students and parents disagree about going to college or not, many students follow their parents' aspirations rather than their own. Why is that? One possibility is that students become more informed over time and realize they prefer the same tracks as their parents. Or students could adjust their choices to their parents' preferences because they want to please them. Students could for example fear disagreement or perceive their parents' love and support as conditional (Assor, Roth and Deci, 2004) and thus use their career choice to signal to their parents.

The second channel would imply a direct link from parents' preferences (and beliefs) to children's career choices that does not operate through students' own preferences and beliefs. The patterns observed in the NEPS data are consistent with several explanations since the causes for the difference between students' aspirations and eventual choices remain unidentified. Students' stated aspirations and their actual decisions differ in several ways. First, aspirations were elicited when students were ca. 16 years old, 2 to 3 years before their actual choice. Students could become more informed over two years, make up their mind about what to do and consequently move towards their parents' aspirations. Second, while aspirations are hypothetical, students' chosen career tracks are actual, consequential choices. In contrast to aspirations, actual choices are therefore subject to potential financial constraints and eligibility requirements. Finally, aspirations were stated in private and confidential, but career choices publicly observable. Isolating the impact of this difference would help identify the causal impact of increased parental pressure. However, given all

other differences this is not possible with NEPS data alone. Observational data thus does not suffice to identify how students adjust their career choices to their parents' preferences.

The challenge is to examine whether students make different career choices because they are publicly observable by their parents. Actual career choices cannot be kept secret from parents while holding everything else constant. Students' stated plans, however, can temporarily be kept secret from parents. This makes it possible to vary whether students' stated plans are observable by parents or not. Making students' stated plans incentive-compatible would further help making them more consequential and not purely hypothetical. I designed the field experiment to address these challenges: I invited students and parents to state their career aspirations and made students' stated career plans experimentally visible to parents or not. To incentivize stated career plans, I instructed participants that stated plans determine what type of expensive, private career advising session students would get if they won one of ten sessions in a lottery. Moreover, students' and parents' preferences and beliefs should be important drivers of students' postsecondary career choices in this context, because financial constraints and eligibility requirements should be less important than in other contexts.

2.4 Field Experiment

I conducted the experiment in collaboration with 47 high schools from North Rhine-Westphalia. School visits constituted the core part of these collaborations and were conducted between July 2019 and March 2021. These visits were in person until February 2020 and mostly virtual afterwards.

Design

The goal of the field experiment was to examine whether students adjust their postsecondary career plans to their parents' preferences. For this purpose, I experimentally varied whether students have to make (educational) choices in private or when they can be observed by parents.

In order to work with students on their current career plans in a realistic environment, I designed a 150 minute-session on planning for the time after high school. The main purpose of these sessions was for students to think more carefully about their plans for the time after high school and to learn more about their own interests and aptitudes. With these goals in mind, I was able to offer these sessions to students in collaboration with high schools. The sessions have two main components. Each

session first starts with 30 to 40 minutes of survey questions around students' career aspirations, subjective beliefs for different career tracks and further background questions. Students then take 100 to 110 minutes of tests typically employed in expensive private career advising sessions. The details of the procedure for career planning sessions are also shown in Figure 2.5.

The tests included standardized personality, interest and cognitive tests that are not freely available to students. Similar tests are often used in assessment centers and in typical private career advising sessions that cost up to \$1,400 in this region. The tests usually take up 40 to 50% of the time of such an advising session. Buying these tests in bulk as a researcher from an external provider, I was able to lower the variable costs per student to less than \$5 and to offer them to students for free. Each participating student thus directly benefited from participating by learning more about themselves and practicing the tests for eventual assessment centers in the future.

For the purpose of incentivizing students' stated career plans, I combined the career planning module with the chance to win one of ten expensive private career advising sessions. This allowed me to truthfully instruct students that their stated career plans would determine what type of advising session they could get. In these sessions, students for example received help with how to prepare for their preferred career track or how to find out which of their preferred options suits them best. Different advisors specialize in different areas, so once I drew the winning students, I found advising sessions that were a good fit to the students' stated career aspirations. If a student was drawn in the lottery who answered "college" to the question about his plans for the time after high school for example, I booked an advising session on preparing for college, or a specific major, for this student. By incentivizing students' stated aspirations in this way, I make their answers consequential, intermediate choices on their way of preparing for the time after high school.

Students therefore directly benefited from participating in several ways. First, from taking the standardized tests, receiving their results and learning more about their interests and aptitudes. Second, by spending time thinking about their plans. And third, by potentially winning a private advising session that would further help them prepare for the time after high school. These benefits for students ensured that the school visits would be mostly about the students and their plans rather than about my research. They also helped with making the participation attractive for students and for schools.

When eliciting students' career plans that would form the basis of a potential advising session, I varied whether students' statements would be shared with their parents or not. In randomizing instructions, I followed the design by Bursztyrn and Jensen (2015), but varied confidentiality with respect to parents rather than peers.

To credibly do so, parents had to be involved in the study and registered with some contact details such as an email-address. I achieved this by inviting parents to participate as well, following a similar design to Tungodden (2018). Surveying parents has additional advantages as parents' preferences do not remain a black box. I can use detailed data on parents' aspirations to identify points of disagreement between children and parents and in which directions parents might push or pull their children's choices.

Visibility Experiment

In order to test whether students make different choices compared to their privately held preferences because their parents can observe their statements, I varied whether students were told that their plans would be shared with their parents or not. I randomized instructions for all students who had at least one parent register to participate and indicate some contact details before my school visit. Most participating students were minors and therefore required parental consent to participate. I used this to invite the parents to participate in the study and share their view on career planning. Students were then given one of the following two instructions as part of the *private* [*public*] condition:

*As starting point for your further planning we will send a copy of your answers on this page **to you** [and your parents]. Your statements won't be shared with anyone else, **also not with your parents** [except for your parents].²¹*

The only difference between these two statements are the words in the brackets that are added to or substituted for the words in bold. Both statements mentioned parents to make sure that the only difference is the visibility to parents, not the mentioning of parents. Most students understood whom their answers would be shared with as figure 2.4 shows. Going from the *private* to the *public* condition, the share of students believing that their answers will be shared with their parents increases from 19% to 88%. In contrast, the share believing their answers will be shared with nobody falls from 75% to 10%.²² These patterns show that the instructions were

²¹The exact German wording was the following in the *private* condition: "Für Deine weitere Planung werden wir eine Kopie Deiner Antworten auf dieser Seite an Dich schicken. Deine Angaben werden mit niemandem ausser Dir geteilt, auch nicht mit Deinen Eltern." The instructions in the *public* condition instead read: "Für Deine weitere Planung werden wir eine Kopie Deiner Antworten auf dieser Seite an Dich und Deine Eltern schicken. Deine Angaben werden mit niemandem ausser Deinen Eltern geteilt."

²²Ineligible students in the non-experimental group, e.g., because their parent(s) did not register, give similar answers to the students in the *private* group. Importantly, a negligible share of students

well understood and achieved what they were set up to do.

I conducted the randomization at the individual level once the registration deadline had passed for an individual school and before the implementation of the career planning module at this particular school. Controlling for school fixed-effects, most differences between students in the two groups should thus be insignificant. Balance tests for relevant covariates are reported in Panel B of table 3.1, confirming that the randomization was successful. Students in the *private* and the *public* condition do not significantly differ with respect to their gender, their socio-economic status or their grade average for example.

Timing and protocol of school visit

Participation was confined to students of upper classes. At schools of the type *Gymnasium*, these are grades 10 through 12. At schools of the type *Gesamtschule*, these are grades 11 through 13. In Figure 2.3, I present an overview of students' transition from upper classes to postsecondary tracks, including students' usual age in different grades and the timing of typical application deadlines. I also include the timing of most school visits and the steps in preparing for them and following up after these visits.

The majority of participating students, 71%, were in their penultimate year of high school because this is the year I mostly targeted. Grades 11 (at *Gymnasium*) and 12 (at *Gesamtschule*) present the right time to ask students about their plans. They should have started to think about what they want to do, but should not have committed to a particular track yet. They usually take the first steps towards preparing applications during the last year of school. As explained in section 2, students usually do not have to take concrete steps until after graduation if they want to go to university. For those planning to take up a dual study program or to pursue vocational training, the typical application deadline is between 9 to 12 months before the start of the program. This implies that they would have to apply during the first half of their last year if they want to start their program in the same year as graduating from high school. When I invited students outside their penultimate year to participate, they were either in the first half of their last year or the second half of grade 10 (*Gymnasium*) or 11 (*Gesamtschule*).

A lot of the relevant fieldwork happened before and after my school visits. First, I contacted schools by emailing the principal and the team responsible for students' career planning curriculum. In this email, I introduced my research project, the believed their answers would be shared with the school (2% in the *private* and 4% in the *public* condition). These patterns further validate the effectiveness of the instructions.

career planning module and its advantages to students and schools, and asked for a meeting. If the school expressed interest, I arranged a meeting to discuss all further details so that the school could decide whether to participate or not. If the school decided to participate, we agreed on all organizational details and initiated the next stage. I invited all students in a given grade by giving them a short presentation of 7 minutes and handing out consent and registration forms for students and parents in envelopes. Interested students and parents had 10 to 14 days to register and consent to participation. After the registration deadline I collected all returned consent forms, registered participants, and prepared all materials for the school visit, including personal envelopes containing survey forms with personalized instructions and test forms. At the day of the school visit, students participated in the career planning module which took the following form, also displayed in figure 2.5.

I begin by reminding students of the purpose of my visit, explain that they can win one of ten private career advising sessions that will be based on their answers in the first survey form, and then hand out the first survey form. Students start with the first survey, the “Career Survey”. Once they are done with this survey, they exchange it against a second survey with questions about their family background, their parents’ preferences and their subjective expectations for different career tracks (termed “Background Survey”). Once students have completed these surveys, students continue with the personality test and, as long as they are proceeding at normal speed, also the interest test. After a break, I led students through a cognitive test that amounts to another 95 minutes.²³

Once students have started the tests, I invited registered parents via email and/or SMS to complete a 15-20 minute survey. The questions to parents mirrored those to their children: I asked parents about their preferred careers for their child, their own careers and their subjective expectations for different career tracks. I reminded parents up to six times for the next two weeks such that 85% of registered parents answered the parent survey. Next, I evaluated students’ personality, interest and cognitive tests and sent them their personal results within a few weeks of the school visit. In a separate message, I shared a copy of their stated career plans with them and for those in the *public* condition, also with their parents.

Sample

I collaborated with 47 high schools in Germany’s most populous state of North Rhine-Westphalia, 35 schools of the type “*Gymnasium*” and 12 schools of the type

²³Schools had the option to opt for a short, 35-minute version of the cognitive test if their schedule did not allow for the long test.

“*Gesamtschule*”. The schools are scattered across the state, with most schools located in the urban centers along the river Rhine, but some in more rural parts of the state. Figure 2.2 shows the geographic distribution of participating schools and of localities where I contacted schools but no school participated. At these 47 schools, 1,195 students and 819 parents participated, leading to a tally of 2,014 conducted surveys. 549 students were eligible for the experimental variation of instructions. For these students, I randomized instructions at the individual level within a given school. In Panels A, B and C of table 3.1, I present descriptive statistics for participating schools, students and parents.

The distribution of students across the two types of schools in my sample is representative of the overall population. While 70% of participating students are at a *Gymnasium*, this share is 76% across the state. Panel A of table 3.1 shows some key difference between the two school types. These illustrate why it is more challenging to reach parents at *Gesamtschulen* and why fewer students at a *Gesamtschule* are part of the visibility experiment than their counterparts at a *Gymnasium*. Among participating students at a *Gymnasium* 65% have at least one parent registered to participate. This share is 39% at a *Gesamtschule*. This translates into different shares of participating students that are part of the visibility experiment: it is 51% at *Gymnasien* and 33% at *Gesamtschulen*.²⁴ This is due to several reasons. First, at *Gesamtschulen*, more students are already of legal age since they had one extra year of schooling. They can consent to participating without asking their parents and their parents are thus less likely to register. Second, students at *Gesamtschulen* are less likely to have a college-educated parent and more likely to have at least one parent who immigrated to Germany. These two factors further lead to lower shares of participating parents at *Gesamtschulen*.

Overall, 52% of students in the sample have at least one college-educated parent, 64% at *Gymnasien* and 26% at *Gesamtschulen*, and 37% at least one parent who was not born in Germany. This share is 28% at *Gymnasien* and 55% at *Gesamtschulen*. The share of students at *Gymnasien* with migration background is representative of a 30% share at *Gymnasien* in Germany. The over-representation of students with college-educated parents at *Gymnasien* matches the general pattern, but is even more pronounced in this sample. Students’ self-reported grade average of 2.21 is slightly better than average grades of 2.44 in North Rhine-Westphalia.²⁵ The sample is 61% girls, which is slightly higher than their state-wide share of 55.2% among high school

²⁴Not every student with a participating parent is eligible for the visibility experiment. Some parents register too late and others have the same contact details as their child.

²⁵See Sekretariat der Ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland (2020) for average grades by state.

graduates in North Rhine-Westphalia.²⁶

Students' parental backgrounds are reflected in the descriptive statistics for participating parents in Panel C of table 3.1. Among 819 participating parents, 52% are college-educated. Among them, 39% come from families with two college-educated parents, 29% from households with one college-educated parent, and 31% from households without a college-educated parent. Among all participating parents, 13% were born outside of Germany. This is lower than the share of 37% of students with at least one parent not born in Germany, illustrating the challenge of recruiting them to participate. While mothers were more likely to participate, 36% of participating parents are fathers.

Overall, the sample of participating students reflects the majority of students at the two types of schools well, but is not perfectly representative. Some students were more likely to participate than others, in particular girls and students with college-educated parents who were born in Germany. Similarly, those whose parents were unlikely to participate are under-represented in the visibility experiment. The characteristics of the sample may lead to an under-representation of potential downward pressure in the visibility experiment. This sample might thus not be the right one to capture this type of parental influence, although I should be well-positioned to capture representative pressure in high SES families. The sample also limits which type of heterogeneous treatment effects I can analyze. There are for example not enough children with migration background to get precise estimates of differences across the *private* and *public* conditions. Finally, I do not find significant differences in the reported relationship quality to parents between those with or without participating parents such that selection based on having more or less harmonious parent-child relationships is not likely to bias the estimates.

2.5 Results

College Aspirations

The majority of students in the *private* condition, 64%, considers going to university when they are asked what they would like to do after high school. Since 71% of these students have a participating parent that considers university for them, it is more common for parents to consider college for their child than for the child to consider college for itself. This pattern is particularly pronounced for high SES students as figure 2.6 shows. While 68% of these students plan to attend college in the *private* condition, 80% of them have a participating parent who considers college for them.

²⁶Recent data for 2019 is provided by Information und Technik Nordrhein-Westfalen (2020).

For low SES students, there is no such difference as 57% of students aspire to college and 56% of them have a parent doing so.

Although students' and parents' college aspirations in aggregate are more aligned for low SES households, this does not mean that these students and parents more often agree with each other. As illustrated in figure 2.6, they actually disagree more often, but the direction of disagreement is more balanced than for high SES households. While 14% of low SES students do not aspire to college but have a parent who does, 15% of them aspire to college but have no parent who does. This is different for high SES students and parents. Among them, 18% of students do not aspire to college but have at least one participating parent who does. However, only 7% among them aspire to college when none of their participating parents does.²⁷ These patterns show that the socio-economic gap of 24 percentage points in college aspirations among parents (with children in the *private* condition) is much more pronounced than the gap of 11 percentage points for their children in the *private* condition.

If students adjust to their parents' preferences, I would thus expect the share of high SES students aspiring to college to increase and the socio-economic gap to widen under increased parental pressure (as in the *public* condition or for actual choices). This is exactly what figure 2.7 shows. The share of high SES students aspiring to college is 9.6 percentage points higher in the *public* than in the *private* condition (p-value of 0.04). The share of low SES students aspiring to college is 4.7 percentage points lower in the *public* than in the *private* condition (not significant).²⁸ As a result, the socio-economic gap increases from 12 percentage points to 27 percentage points, with 78% of high SES students aspiring to university, but only 51% of low SES students doing so. This suggests that students' willingness to adjust their plans to their parents' preferences exacerbates socio-economic differences in college plans. Taking this reduced-form evidence to decompose the gap of 27 percentage points in college plans in the *public* condition implies that more than half of the gap may be due to students' adjustment to their parents rather than due to students' own private preferences and beliefs.

In column (3) of Table 2.2, I present the same results reported in figure 2.7

²⁷Not all parents are aware of these cases of disagreement with their children. For example, 19% of parents whose child does not aspire to college wrongly believe it does. This misconception is particularly pronounced among college-educated parents whose child does not aspire to college. Almost 31% of them believe that their child aspires to college, whereas this share is 13% among parents without college education.

²⁸The overall effect is an increase in college aspirations of 5 percentage points (not significant), as shown in columns (1) and (2) of table 2.2. This effect is in line with the overall differences between students and parents as found in figure 2.6.

for a linear probability model in regression format. In columns (2), (4) and (5) I include school fixed effects since treatment was assigned at the individual level within schools. The coefficient on the difference in socio-economic gaps is stable and slightly higher at 16 percentage points. This coefficient represents the effect of the *public* condition on the socio-economic gap in college aspirations within schools and thus is not driven by differences across schools. The socio-economic gap in *private* aspirations falls to 1 percentage point when controlling for school fixed effects, compared to 13 percentage points without school fixed effects. This suggests that in my data, the socio-economic gap in *private* aspirations is mostly driven by students from different socio-economic backgrounds attending different schools with differing levels of (*private*) college aspirations. Hence, students of different backgrounds at the same school appear to aspire to college at similar rates in *private*. In presence of this result, it is even more illuminating that within schools, the socio-economic gap in college plans only emerges when making students' college aspirations visible to parents.

What makes students adjust their stated aspirations in line with their socio-economic background and thus causes the socio-economic gap to increase under the heightened influence of parents? To answer this question, it is useful to distinguish students' parental background in more detail than the binary label "low" vs. "high" socio-economic status does. Students from so-called "high" socio-economic background fall into two groups: those with 2 college-educated parents and those with one college-educated parent and another parent without college education. As figure 2.8 shows, these two groups of students behave quite differently across the *private* and *public* condition. Among students with two college-educated parents, ca. 80% aspire to college, regardless of the experimental condition. For students with only one college-educated parent, however, the visibility of aspirations makes a big difference: whereas 60% of them aspire to college in the private condition, this share increases to 75% in the public condition (the p-value of this difference is 0.05).²⁹

The socio-economic gap therefore mainly increases from the private to the public condition, because those with one college-educated parent more often state an aspiration to attend college. This behavior seems to be driven by these students adjusting to their college-educated parent's preference. Their college-educated parent aspires

²⁹Students were also asked a continuous version about their preference for college vs. vocational training. The results in Figure B.3 are similar to the discrete version: students with 1 college-educated parent state an increased desire for college in the public condition and again seem to adjust to their college-educated parent. Moreover, among these students it appears to affect those at the margin, moving their preference closer to college when it otherwise would have been closer to vocational training or at the point of indifference. There is no significant difference for students with either zero or two college-educated parents.

to college more often than they do in the *private* condition: compared to 60% among the students, 75% of the college-educated parents in these families state a preference for college attendance. As a consequence, students with one college-educated parent resemble their parent without college education (and like students without college-educated parents) in the *private* condition and their parent with college education in the *public* condition. In contrast, students with zero or two college-educated parents report college aspirations at rates very similar to their parents in both the *private* and the *public* condition.

This interpretation of students following their more educated parent when it comes to making an observable career choice – even if in private they might hold different aspirations – is supported by suggestive evidence from variation in which of the two parents registers to participate and is reported in Appendix Table B.5. Among students with 1 college-educated parent, observable aspirations increase the share of students aspiring to college by 17 percentage points if their college-educated parent registered to participate in the study (significant at the 5-percent-level). If only the parent without college education registered to participate, the estimated coefficient is just 6.8 percentage points.

The observed differences across students from “high” socio-economic backgrounds with either 1 or 2 college-educated parents point to different channels of parental influence on their children’s college attendance that I examine in more detail in section 2.6. Children with 2 college-educated parents might have already internalized their parents’ preferences and beliefs, such that it is clear to almost all of them that they want or should want to attend college. As a result there is a ceiling effect for them. To the extent that this internalization has at least partly happened because of parents’ expectations for their children, the difference between the private and public conditions presents a lower bound for the extent to which children adjust to their parents’ college aspirations. Children of 1 college-educated parent, on the other hand, do not appear to have fully internalized yet that going to college is what they should want to do, potentially because they are exposed to both of their parents’ preferences and beliefs that do not uniformly pull their own preferences and beliefs into the direction of attending college. When making decisions, however, these students seem to know that their college-educated parent would like them to go to college and find this expectation important enough to adjust to it.

Preferred Fields

Parents’ influence does not end at going to college or not. Students are also willing to adjust their preferred field to their parents’ preferences. When sharing aspirations with parents, students tend to shy away from fields such as “Arts, Music, Design”

and instead become more likely to state an aspiration for fields with higher earnings, such as “Business and Economics”. Students’ adjustments are once more in line with parents’ preferences for fields and overall lead students to switch from fields in the lower half of earnings – Arts, Music, Design; Linguistics and Cultural Studies; Agriculture and Forestry; Education; Social Sciences – to fields in the upper half of earnings – Business and Economics; Engineering; Maths and Natural Sciences; Law; Medical Studies. Similar as for college aspirations, this effect is particularly pronounced for students with 1 college-educated parent, complementing the effect on college aspirations.

After being asked whether they would like to go to college after high school or had alternative plans, students were asked which fields of study they aspired to. For this purpose, students were asked to rate 10 different fields in terms of their attractiveness to them, on a scale of 0 (“completely unattractive”) to 100 points (“extremely attractive”).³⁰ Based on students’ rankings for each field, I code a binary variable for each field, indicating whether it received the student’s highest rating and is thus top-ranked by this individual student. I repeat the same procedure for parents who answered an equivalent question. Using students’ and parents’ top-ranked fields (in the private condition), I can compare the relative attractiveness of fields among students and parents by calculating the difference between the share of parents ranking a given field top and the share among students giving this field their highest rating.³¹ The differences indicate which fields are relatively more favored by parents than children and are portrayed on the x-axis of figure 2.10.

In comparison to students, parents find fields such as “Maths, Natural Sciences”, “Business and Economics” and “Engineering” attractive, but especially dislike “Arts, Music, Design”. When making their aspirations observable by parents, students react in ways that align with parents’ preferences: they shy away from “Arts, Music, Design” and become more likely to aspire to “Business and Economics”. As shown in figure 2.10, the difference between the public and the private condition (represented on the y-axis) is higher for fields that are relatively more preferred by parents. The exception to this pattern is “Engineering”, which students are less likely to state when aspirations are observable even though parents find it relatively attractive

³⁰The translation of the exact question students were asked, is the following: “Which fields of study do you find the most attractive? Please state how attractive you find the following fields of study, on a scale of 0 points (“completely unattractive”) to 100 points (“extremely attractive”).” The question then listed the following 10 fields: Agriculture and Forestry; Arts, Music, Design; Education; Linguistics and Culture; Social Sciences; Business and Economics; Engineering; Maths, Natural Sciences; Law; Medical Studies.

³¹Compared to students, parents are more likely to rank more than one field top, which is why most differences are non-negative.

in comparison to their children. The result for Engineering is driven by students without any college-educated parents who are 12 percentage points less likely to aspire to engineering in the public condition (more detailed results are shown in Figure B.6).

Next, I collapse fields into two categories by their graduates' average earnings and find that students become more likely to aspire to fields with higher earnings when their aspirations are shared with their parents (see figure B.4). This effect is again most pronounced for students with one college-educated parent, for whom the share aspiring to a field with higher earnings increases by 17 percentage points (p-value of 0.03). These students resemble students without any college-educated parents in private, but those with 2 college-educated parents in public. Together with the effect on students' college aspiration, this tendency also leads to a doubling of the socio-economic gap in students aspiring to enroll in a field with relatively high earnings at college. While in private 35% (47%) of students from low (high) socio-economic backgrounds aspire to college and a high earning field, these shares are 32% and 58% in the public condition (displayed in figure B.5).

Hence, students are willing to adjust not only their college aspirations to their parents' preferences, but also what field to study at college. As a consequence, both the socio-economic gap in overall college aspirations and in the shares of students aspiring to studying high-earning fields at university increase significantly.

2.6 Decomposing the socio-economic gap in (observable) college aspirations

The reduced-form evidence shows that students are willing to adjust their aspirations to their parents and suggests that the adjustment is sizable. How important is this adjustment to parents relative to the contribution of students' private beliefs and preferences in explaining the socio-economic gap in college aspirations?

To decompose the socio-economic gap in college aspirations, I elicited detailed subjective beliefs for the career tracks undergraduate studies, dual study programs and vocational training, and develop a model of career choice. The model embeds both students' preferences and beliefs and their potential adjustment to parents when choices are observable. After estimating the unobserved components of this model, the utility weights, I can decompose the socio-economic gap in college aspirations into the three components utility weights, beliefs and adjustment to parents.³² These

³²Note that I use the term utility weights and not preferences when writing about decomposing the gap into three components because beliefs may be tainted by preferences. This means

three components represent two potential avenues of intergenerational transmission: the joint influence of preferences and beliefs possibly represent a transmission via internalization of parents' beliefs and preferences and I hence term the contribution of these factors "internalized components". Transmission via students' adjustment to parents, on the other hand, represents a direct impact of parents that cannot be explained by students' own preferences and beliefs regarding different career tracks.

I use the experimental variation of visibility to parents and detailed data on students' subjective expectations (beliefs) regarding the available career tracks to estimate the unobserved components of the model. The choice model and elicited beliefs data build on similar approaches to decompose socio-economic or gender gaps in career choices by Zafar (2013), Boneva and Rauh (2017), and Giustinelli (2016). One caveat of this approach is that utility weights for different choice aspects are estimated using non-exogenous variation in subjective beliefs across individuals and career tracks. This can lead to biased estimates if unobserved beliefs and preferences relevant to one's subjective expected utility from different career tracks are correlated with observed beliefs (Wiswall and Zafar, 2015).

Beliefs and Preferences

When students are deciding which career track they prefer, they have to form subjective expectations for several aspects of the different alternatives and then figure out which option compares most favorably to all others. While students could care about a multitude of aspects, the relevant aspects typically belong to a handful of categories such as social, material/financial or individual performance concerns, as well as concerns around enjoyment, interest and challenge involved in the various career tracks. Among these relevant aspects, some concern the immediate future, i.e. the 3 to 4 years after high school, whereas others concern long-term outcomes such as having an enjoyable job in one's thirties.

I elicited students' (and parents') subjective beliefs with respect to 15 relevant scenarios covering the aspects introduced above for the three most common career tracks undergraduate studies, dual study program and vocational training. The selection of scenarios is inspired by Zafar (2013) and Boneva and Rauh (2017). All of these 15 scenarios are displayed in table B.8, of which 10 relate to immediate characteristics in the first 3 to 4 years after high school and 5 scenarios apply to the more distant future at age 30 to 35. I elicited students' beliefs by asking them to rate

that students' internalized concerns cannot be cleanly separated into preferences and beliefs. Together, students' beliefs and preferences make up their internalized concerns, which is why I use the term preferences and beliefs when distinguishing internalized aspects from students' adjustment to pressure.

the likelihood of a certain binary aspect – such as graduating or not – materializing for each of the three career tracks on a scale from 0 to 100.³³ Each student thus compares all three alternatives for 15 different scenarios, resulting in 45 career track-scenario-specific expectations that are informative about students’ different expectations for the three career tracks across various relevant aspects.

Students hold quite different expectations for the different scenarios and career tracks and their expectations clearly vary by their family background, as portrayed in figure B.8. Compared to students from low SES backgrounds, students from high SES families have more optimistic beliefs about college when it comes to positive aspects such as enjoying one’s social life or finding the covered material interesting. They are less pessimistic when it comes to negative aspects such as expecting to struggle financially. When comparing students’ beliefs for vocational training, on the other hand, high SES students are less optimistic than low SES students in terms of finding the relevant tasks interesting, expecting to finish the program (“graduating”) or achieving a job of desirable status. Overall, high SES students thus perceive higher returns to college than low SES. This is both because they perceive college more positively and vocational training more negatively than low SES students.

Students from high SES families also expect higher pecuniary returns of going to college or pursuing dual study programs than students from low SES families (see figure B.7). This is mainly due to higher expected earnings conditional on going to college (€5,129 vs. €4,600) or pursuing a dual study program (€4,556 vs. €4,167), as students from either background have comparable expectations upon pursuing vocational training (€3,247 vs. €3,158).

Choice Model

How do these beliefs matter for students’ career plans? The model and its estimation embody the intuition that students prefer a career track they expect to outperform

³³More specifically, they are elicited in the following way: *“Try to imagine your life during the 3 to 4 years after high school (and a potential gap year) for the cases that you pursue vocational training, a dual study program or undergraduate studies. How would you imagine your life to be during those 3-4 years in these scenarios? Please estimate for all three scenarios (undergraduate studies, dual study programs, vocational training), how certain you are on a scale of 0 (“extremely unlikely”) to 100 (“absolutely certain”) that you will...”* Students read this introduction and then the relevant scenario for each of the 10 immediate scenarios such as: *“finish the respective program and graduate?”* They then state a value between 0 and 100 for all three alternatives and move on to the second scenario that concludes with *“enjoy your social life and social activities?”* Before they reach the 5 scenarios for the more distant future, students are asked to *“now please imagine again for all three scenarios (...) that at the age of 30 to 35 you will...”* and proceed in the same way as before.

alternative tracks regarding aspects they care about.

Baseline Model

Suppose a student s has expected utility SEU_{sj} from choosing a career track j between college ($j = 1$), dual study programs ($j = 2$) or vocational training ($j = 3$). Students' subjective utility for this static choice problem depends on a vector of k binary outcomes b with $b_1, b_2, \dots, b_k \in \{0, 1\}$ and subjective likelihoods $\pi_{sj}(b_k = 1) \equiv \pi_{sjk}$ of each outcome k materializing conditional on choosing career track j . Assuming additive separability for the 15 binary outcomes I introduced above, these can be interpreted in the following way: students expect to derive a certain utility from the positive outcome of graduating ($u(b_{\text{Graduating}} = 1)$) and a different level of utility from the negative outcome of not graduating ($u(b_{\text{Graduating}} = 0)$). The difference between these two levels $u(b_k = 1) - u(b_k = 0)$, denoted by Δu_k , e.g. $\Delta u_{\text{Graduating}}$, indicates how much students care about an aspect such as graduating or not. Students may also care about the expected earnings for the different career tracks. Assuming risk neutrality, it is sufficient to include the mean expected earnings rather than the full distribution of expected earnings. Students' expected gross monthly earnings for career j are captured by $E_s(c_j)$, with γ governing how strongly earning expectations affect students' expected utility. Finally, I allow the preference parameters, i.e. the $u(b_k = 1)$, $u(b_k = 0)$, γ to vary by socio-economic background $X_s = \{L, H\}$, indicating low and high socio-economic background:

$$SEU_{sj} = \sum_{k=1}^K [\pi_{sjk} u(b_k = 1, X_s) + (1 - \pi_{sjk}) u(b_k = 0, X_s)] + \gamma(X_s) E_s(c_j) + \epsilon_{sj} \quad (2.1)$$

Students may care about other factors unobserved to the researcher, which is reflected by ϵ_{sj} . Using $\Delta u_k \equiv u_k(b_k = 1) - u_k(b_k = 0)$, I can re-write students' expected utility as:

$$SEU_{sj} = \sum_{k=1}^K \pi_{sjk} \Delta u_k(X_s) + \sum_{k=1}^K u(b_k = 0)(X_s) + \gamma(X_s) E_s(c_j) + \epsilon_{sj} \quad (2.2)$$

Before estimating the unobserved utility weights $\Delta u_k(X_s)$ and $\gamma(X_s)$ with the help of the observed expectations π_{sjk} and $E_s(c_j)$, I enrich the model by acknowledging students' desire to potentially adjust to parents when their choices are observable by parents.³⁴

³⁴ $u(b_k = 0)$ is unobserved, but not critical for identification. It does not affect the ordering of tracks.

Enriched Model

For that purpose, assume that students gain subjective expected utility λ_j when their stated aspiration is observable by parents, which may vary by socio-economic background X_s . This wedge could reflect students' reluctance to publicly go against what they believe their parents think is best for them or increased/decreased approval by their parents depending on their plans (as in parents' conditional regard theory, e.g. Assor, Roth and Deci (2004)).³⁵

Defining d_s as students' stated plan, itself the result of subjective expected utility maximization, i.e. $d_s \equiv \arg \max_{j \in J} SEU_{sj}$, parents' p information set can be expressed as $Info_p = \{\emptyset, d_s\}$ and students' subjective expected utility as follows:

$$SEU_{sj} = \sum_{k=1}^K \pi_{sjk} \Delta u_k(X_s) + \sum_{k=1}^K u(b_k = 0)(X_s) + \gamma(X_s) E_s(c_j) + \lambda_j(X_s) 1_{(Info_p=d_s)} + \epsilon_{sj} \quad (2.3)$$

I identify $\lambda_j(X_s)$ by experimentally varying the visibility of students' aspirations to parents $1_{(Info_p=d_s)}$ and analyzing the resulting differences in stated aspirations. The unobserved components $\Delta u_k(X_s)$ and $\gamma(X_s)$ are identified from cross-sectional variation in students' beliefs for different career tracks and their association with students' stated aspirations.

Estimation Approach

Comparing two options, for example $j = 1$ (College) and $j = 3$ (Vocational Training), a student aspires to college if the subjective expected utility of college is higher than for vocational training, $SEU_{ij=1} \geq SEU_{ij=3}$, or if:

$$\epsilon_{sj=3} - \epsilon_{sj=1} \leq \sum_{k=1}^K [\pi_{sj=1k} - \pi_{sj=3k}] \Delta u_k(X_s) + \gamma(X_s) (E_s(c_1) - E_s(c_3)) + (\lambda_1(X_s) - \lambda_3(X_s)) 1_{(Info_p=d_s)} \quad (2.4)$$

³⁵Students may have internalized some desire to gain approval in their private aspirations, but could overestimate their willingness/ability to choose a path independent of their parents' approval. Bringing this concern to the present may thus lead to behavior that reflects the strength of these concerns more accurately.

This illustrates that opting for college rather than vocational training can be driven by the perceived returns to college in terms of the likelihood of outcomes k , $\pi_{sj=1k} - \pi_{sj=3k}$, weighted by their importance $\Delta u_k(X_s)$, by the expected monetary returns to college $E_s(c_1 - c_3)$ weighted by the relevance of earnings, $\gamma(X_s)$, and by the expected utility difference from parents observing one's plans: $\lambda_1 - \lambda_3$. I normalize $\lambda_3 = 0$, such that the estimated λ_j indicate the change in expected utility relative to stating a preference for vocational training. This introduces a wedge between alternatives that is not present when options are considered in private. Assuming that the errors ϵ_{sj} are of type I-extreme value and i.i.d., the probability of a student stating an aspiration for career track j can be expressed as:

$$Pr(d_s = j) = \frac{\exp(\sum_{k=1}^K \pi_{sjk} \Delta u_k(X_s) + \gamma(X_s) E_s(c_j) + \lambda_j(X_s) 1_{(Info_p=d_s)})}{\sum_{j=1}^J \exp(\sum_{k=1}^K \pi_{sjk} \Delta u_k(X_s) + \gamma(X_s) E_s(c_j) + \lambda_j(X_s) 1_{(Info_p=d_s)})} \quad (2.5)$$

I estimate this conditional logit via maximum likelihood. Students' stated career plans are the dependent variable, explanatory variables are students' alternative- and individual-specific subjective beliefs π_{sjk} , $E_s(c_j)$ and the individual-specific visibility to parents $1_{(Info_p=d_s)}$.

Estimation Results

I estimate the model components using those students who have data on all components of the model and present the results in table 2.3.³⁶ For high SES students, observability introduces a pronounced utility premium of attending college that is not present for low SES students. The coefficient of .98 is large compared to those for other career aspects. For example, students' expectations to find the material and tasks in college enjoyable would have to increase by 26.3 percentage points to reach an equivalent impact. In terms of expected monthly earnings, it would even require an increase of €4,321, illustrating both the importance of parent pressure and that expected earnings are not the primary concern behind students' plans. This is true for low and high SES students: expected earnings matter, but various non-pecuniary career aspects are more important. The most important aspects for students from both backgrounds are expecting to finish a career track (or graduate), as well as enjoying both the covered material/tasks and an eventual job. These results are in

³⁶This includes students who were not part of the visibility experiment. They contribute to more precise estimates of Δu_k and γ . Students who did not manage to fill out the subjective expectations module are dropped. This includes students at one school where time did not suffice to administer this module.

line with findings by Zafar (2013) and Boneva and Rauh (2017). They found that non-pecuniary factors matter more than pecuniary factors for college plans and major choices and that students particularly care about enjoying a particular path and parental approval.

While low and high SES students care about many pecuniary and non-pecuniary aspects in similar ways, there is evidence that they weigh certain aspects differently. High SES students care much more about achieving a job of desirable status, and potentially also about parental and family support in the short term, whereas low SES students may care more about an eventual work-life-balance and social aspects of different career aspects.

Using the point estimates of the unobserved components together with the observed components of the model I next turn to examining which components may explain the socio-economic gap in college aspirations. For this purpose, I use a non-linear equivalent of the Oaxaca-decomposition to analyze to what extent the gap can be explained by the model and its components of utility weights, beliefs and adjustment to parents.

Decomposing the socio-economic gap: channels of intergenerational transmission

Three separate sources can contribute to the socio-economic gap in college aspirations when they are observable by parents: different beliefs (subjective expectations π_{sjk} and $E_s(c_j)$), differences in utility weights (Δu_k and γ in the model) and third, differences in the extent to which low and high SES students adjust their stated aspirations when they are visible to parents. As both, beliefs and utility weights are held internally by students and have possibly been internalized by them as a result of their family upbringing, these two components reflect the importance of “internalized components”.³⁷

To what extent can these three components explain the socio-economic gap of 27.6 percentage points in college aspirations (when these are observable) and how important is the adjustment to parents relative to the internalized components? For this purpose, I combine the estimated and observed components of the model, assume that aspirations are observable by parents (such that $\lambda_j(X_s)$ is active for every student) and calculate the predicted socio-economic gap in college plans as shown

³⁷Note that some of the belief components – e.g. expectations to enjoy the material or tasks – are probably tainted by students’ preferences and thus do not allow a clear-cut separation of the importance of preferences and beliefs. This is why I speak of “utility weights” rather than preferences.

in equation 2.6. I denote the probability of aspiring to college when aspirations are visible, $Pr(d_s = \text{College} | \text{Info}_p = d_s)$, by $Pr_{\text{College}}(\pi_s \beta_{X_s}, \lambda_{X_s})$, where $\beta_{X_s} \equiv (\Delta u_1(X_s), \dots, \Delta u_{15}(X_s), \gamma_X(s))'$ and $\pi_{sj} \equiv (\pi_{sj1}, \dots, \pi_{sj15}, E_s(c_j))$.³⁸

$$\Delta^{SES} = \underbrace{E[Pr_{\text{College}}(\pi_s \beta_H, \lambda_H) | X_s = H] - E[Pr_{\text{College}}(\pi_s \beta_L, \lambda_L) | X_s = L]}_{\text{Predicted Gap}} \quad (2.6)$$

The predicted gap Δ^{SES} is 24.4 percentage points. The model thus predicts 89% of the actual, observed gap (see figure 2.11a). I next decompose the gap into its three components:

$$\begin{aligned} \Delta^{SES} &= \underbrace{E[Pr_{\text{College}}(\pi_s \beta_H, \lambda_H) | X_s = H] - E[Pr_{\text{College}}(\pi_s \beta_H, \lambda_L) | X_s = H]}_{\Delta^\lambda (\text{Adjustment to Parents})} \\ &+ \underbrace{E[Pr_{\text{College}}(\pi_s \beta_H, \lambda_L) | X_s = H] - E[Pr_{\text{College}}(\pi_s \beta_L, \lambda_L) | X_s = H]}_{\Delta^\beta (\text{Utility Weights})} \\ &+ \underbrace{E[Pr_{\text{College}}(\pi_s \beta_L, \lambda_L) | X_s = H] - E[Pr_{\text{College}}(\pi_s \beta_L, \lambda_L) | X_s = L]}_{\Delta^\pi (\text{Beliefs})} \end{aligned}$$

The results are presented in figure 2.11a: adjustments to parents accounts for 10.8 percentage points or 44% of the predicted gap, whereas internalized aspects account for 13.6 percentage points or 56% of the predicted gap. Interestingly, beliefs account for 89% of the internalized components suggesting that different utility weights are not the primary driver behind the socio-economic gap in college aspirations.

According to the decomposition, the two main drivers behind the pronounced socio-economic gaps in college aspirations are therefore students' beliefs and their adjustment to their parents. This suggests two key channels of intergenerational transmission that could explain intergenerational immobility in this context. The transmission of family-specific subjective beliefs to children and the direct impact of parents' preferences and beliefs as students are willing to adjust to their parents.

This is corroborated by conducting the same decomposition exercise for the comparison of those without any college-educated parent against those with one college-educated parent and then separately against those with two college-educated parents. The results underline the varying importance of these two separate channels for different types of families: while 78% of the gap between low SES students and those

³⁸ $Pr_{\text{College}}(\pi_s \beta_{X_s}, \lambda_{X_s} | X_s)$ is thus a simplified version of the general probability to aspire to career track j : $Pr(d_s = j) = \frac{\exp(\pi_{sj} \beta_{X_s} + 1_{\text{Info}_p = d_s} \lambda_{j, X_s})}{\sum_{j \in \{\text{College}, \text{Dual}, \text{VocEd}\}} \exp(\pi_{sj} \beta_{X_s} + 1_{\text{Info}_p = d_s} \lambda_{j, X_s})}$.

with one college-educated parent is attributed to the adjustment to parents, the majority of the gap – 78% – between low SES students and those with two college-educated parents is assigned to internalized components rather than the adjustment to parents.

Importantly, these two channels – parents’ direct influence and the transmission of beliefs – can apparently act as substitutes in making sure children attend college. One of them – perceived parental expectations to attend college or beliefs clearly favoring college – can suffice to lead to high rates of college aspirations, but the absence of both will likely lead to much lower rates of college attendance.

The reduced-form evidence in figure 2.8 gave a first hint at this: while most students with two college-educated parents aspire to college even in the private condition, students with one college-educated parent only reach comparable levels in the public condition. In the private condition, on the other side, they are not much more likely to aspire to college than those without any college-educated parents. Combining this with data on students’ beliefs (in form of their perceived returns of going to college, e.g. as compared to vocational training in figure B.9) suggests that the observed differences in college aspirations across these three groups in the private condition may be due to differences in their beliefs: while students with two college-educated parents have the highest and students without any college-educated parents have the lowest (for some scenarios even negative) perceived returns of going to college, those with one college-educated parent hold intermediate beliefs between these two extremes, which in some aspects are closer to those by low SES students than those by the other group of high SES students (e.g. with respect to scenarios “Social”, “Support”, “Graduating” or “Status”).

This intuition is visualized in figure B.10, in which I plot the estimated kernel density of students’ predicted likelihood to aspire to college based on their subjective beliefs only. Those with 2 college-educated parents are the clear outliers with most of them predicted to be almost certain to aspire to college. Their overall beliefs therefore set them apart from the two other groups of students and are consistent with them having internalized college as the appropriate path for them. High SES students with only one college-educated parent, on the other hand, do not appear too different from those without any college-educated parents.³⁹

For students with two college-educated parents it thus seems their internalized

³⁹Students’ predicted likelihoods based on their beliefs are obtained in two steps: first, I estimate the baseline choice model for students in the private condition only (via maximum likelihood estimation of the conditional logit model), separately by low and high SES background. Using the estimated utility weights, for each individual with stated subjective beliefs, I can then calculate the predicted likelihood of aspiring to college by plugging in the beliefs into the estimated subjective expected utility model.

pro-college beliefs that makes the majority of them clearly favor college over alternative tracks, whereas for students with only one college-educated parent it is not so much their own beliefs, but their adjustment to parents that ensures comparably high rates of college aspirations. The key difference between students with one or no college-educated parent therefore seems to lie not in their beliefs, but their perception of parental expectations: the presence of at least one college-educated parent, many of whom would like their child to attend college, appears to go hand in hand with some perceived pressure to adjust in this direction. This perceived pressure is absent for most students without any college-educated parents (see figure 2.8).

The importance of beliefs in explaining the socio-economic gap in college aspirations and the differences in beliefs across family backgrounds – especially between families with one and two college-educated parents – raise two follow-up questions: one, which beliefs matter most? Second, where do these beliefs come from, especially those that matter most?

Decomposition: Contribution of Individual Belief Components

I find that much of the gap originating from beliefs can be explained by differences in beliefs with respect to only 4 scenarios around one's expected enjoyment of different career paths and eventual jobs, one's social life and graduation prospects (see figure 2.11b). To compare counterfactuals, I simulate replacing low SES students' belief distribution for each of the 15 scenarios by the respective belief distribution of high SES students.⁴⁰

The biggest contribution to the gap comes from students' subjective beliefs about their personal interests: if students from low socio-economic backgrounds were given the same beliefs for the three career tracks about finding the covered material or the tasks at work exciting and expecting to enjoy them as high SES students, the predicted gap closes by more than 5 percentage points. Equipping them with high SES students' beliefs of whether they would enjoy their eventual job given a particular

⁴⁰The exact procedure I use follows similar approaches by Zafar (2013), Giustinelli (2016) and Boneva and Rauh (2017). Since there are fewer students of low than high socio-economic background in my sample, I draw a random sub-sample of high SES students that equals the number of low SES students. Next, I separately rank students in both groups by their predicted probability of aspiring to college. Students of low socio-economic background are then given the beliefs (for college, dual studies and vocational training) of the student with the same rank in the group of students from high socio-economic background. For each student (and individual belief category), I can now calculate the difference in the predicted probability of aspiring to college and then repeat this 100 times.

career track closes the gap by almost 3 percentage points. This illustrates the importance of one's personal interests and expectations of what one will find interesting not only for students' individual plans, but also for explaining the socio-economic gap in aspirations. Students from all backgrounds care about finding something they would enjoy doing, but students with college-educated parents are more confident in college's ability and less confident in vocational training's ability to deliver in this regard than students without college-educated parents.

The second biggest contribution comes from differences in expecting to graduate and to finish a certain career track, closing the gap by 4 percentage points. While high SES students are more confident than low SES students about graduating if they were to embark on an undergraduate degree, they are less confident about finishing their vocational training were they to start one. The last sizable factor are students' expectations about enjoying their social life: making low SES students as confident about enjoying their social life under different scenarios as high SES students would close the gap by almost 3 percentage points.

All these factors have two things in common: students of low socio-economic background care about them and they perceive much lower "returns" to college compared to alternatives than students of high socio-economic backgrounds (because they are less optimistic for college, more optimistic for the alternatives, or both). This also explains why some aspects do not seem to matter for the socio-economic gap in aspirations. While low SES students are much more pessimistic about struggling financially in college than high SES students, potential financial struggles do not seem to matter too much in deciding for or against college and thus, expecting less financial struggles would not make them more likely to aspire to college. An eventual work-life-balance, on the other hand, appears to matter to low SES students, but students of both backgrounds have very similar beliefs with respect to work-life-balance in different career tracks such that swapping their belief distributions does not make a difference.

Origin of Beliefs

Given that students' beliefs differ markedly by parental background, it is natural to suspect that these beliefs might have been transmitted by parents (or families and social networks more generally). Is there correlational evidence for a link between students' and parents' beliefs and could it explain why students hold such different beliefs depending on whether they have zero, one or two college-educated parents?

Using data on students' and parents' subjective beliefs, I find that there is a strong link between parents' and students' perceived returns to college. Moreover, students'

beliefs are related to both their mothers' and fathers' beliefs (see table 2.4).⁴¹ This provides correlational evidence for family-specific beliefs. I cannot establish this link as causal from parents' to students' beliefs since reverse causality and unobserved influences on students' and parents' beliefs might matter, too.

In table 2.4, I present a strong relationship with a coefficient of .45 when regressing students' perceived returns to college over vocational training ($\pi_{sj=college} - \pi_{sj=VocEd}$) on their parent's perceived returns. This result is based on pooling data for all 14 career aspects for which I have data from both students and parents. The relationship between students' and parents' beliefs remain almost unchanged when controlling for families' socio-economic background or school fixed effects. This suggests that family-specific characteristics rather than socio-economic background or the school environment drive the strong correlation between students' and parents' beliefs.

Two further results highlight the importance of family when it comes to career-specific beliefs. First, the relationship between students' and parents' beliefs is the strongest for those aspects that matter the most for the socio-economic gap. In particular for expecting to enjoy the tasks and material in different career tracks (see table B.6 for separate regressions for each scenario). Each percentage point increase in parents' perceived returns to college in this domain is associated with a 0.61 percentage point increase in the child's perceived returns. The next strongest relationship, expecting to enjoy one's eventual job, shows a coefficient of 0.4.

Second, for those families with data on the student's, the mother's and the father's beliefs, the association between students' and each parent's beliefs is significant and sizable for both parents (see table 2.4). If part of the relationship captures a causal link from parents' to students' beliefs, this finding suggests that both parents exert some independent influence on their child. This would help explain why students with zero, one or two college-educated parents have different beliefs. In particular, it could explain why those with one college-educated parent have less positive views of college than those with two college-educated parents. Being exposed to parents with and without college experience could lead to more moderate beliefs than exposure to two parents with college experience. On top of that, college-educated parents in these "mixed" families have more moderate views themselves. This might reflect a different disposition and openness to a partner without college education, or the moderating influence of the partner.

Finally, both students and parents were asked what factors are important for

⁴¹Parents' beliefs are elicited in a way parallel to the procedure for students. They are instructed to imagine their child were to take up undergraduate studies, a dual study program or vocational training. For each scenario, they are asked for their probabilistic beliefs that this aspect will materialize under the three alternatives.

choosing between careers.⁴² These answers can be transformed into relative weights on the various factors such that they can be compared to the utility weights estimated in the structural model. Interestingly, these decision weights elicited in the survey show a weaker correlation between students and parents than the beliefs (with a coefficient of .27 when pooling all weights). This could either reflect increased noise in these measures or a weaker relationship. What broad aspects students care about may thus be less family- or background-specific than the elicited beliefs. This could also explain why utility weights seem to play a subdued role in explaining the socio-economic gap in college plans in this context.

Following the results in this section, parents have two main avenues of shaping their children's college aspirations. Indirectly via students' beliefs about what different careers will be like and directly via children's adjustment to parental expectations. Why do students adjust to their parents' preferences beyond their own preferences and beliefs?

2.7 Who adjusts and why? Heterogeneities in Adjusting to one's Parents

Why are students adjusting to their parents, i.e. which psychological or social motivations are behind it? This project was not designed to distinguish between different theories. Examining who adjusts to parents might yield suggestive insights into the motivations behind this adjustment, however. There are two crucial elements to observing students adjusting to parents. First, students have to perceive a reason why falsifying their aspirations may be desirable when they are observed by parents (such as fearing disagreement). Second, after perceiving a reason to adjust their aspirations, students have to be willing to actually do so.

In this section I therefore examine how students' adjustment to parents varies by groups of students. I focus on potential differences by students' beliefs, grades, gender, agreeableness or migration background. These groups might differ in one or

⁴²Students were asked the following question: "When choosing an occupation or a major, many factors play a role. How important are the following aspects for your decision? *Try to indicate the relative importance of the different aspects by assigning every aspect a value between 0 and 100 (the higher, the more important). If an aspect is twice as important to you than another aspect, assign this aspect a value that is twice as high as the value for the other aspect.*" Following 16 aspects were listed: earning opportunities; status and prestige; working conditions; personal interests; personal talents; personal satisfaction; self-realization; approval parents; approval friends and peers; financial security and independence; costs educational path; earning money soon; proximity family; proximity friends; duration educational path; personal satisfaction; common good.

both of these aspects. Since my statistical power to analyze these heterogeneities is limited, I report the results with the caveat that they can only be suggestive. Nevertheless, I hope that a more careful analysis of these and other dimensions of heterogeneity will prove fruitful in future.

Subjective Beliefs

Using students' subjective beliefs, I employ the estimation approach as above to obtain a predicted likelihood to aspire to college for every individual. Figure 2.12 displays the actual shares of students aspiring to college in the *public* condition against the predicted probability of doing so. The figure illustrates potential heterogeneous effects of parental pressure depending on how positive students' expectations are regarding college. Those whose beliefs are not in line with going to college show the biggest reaction to the *public* condition. Students from high SES backgrounds become more likely to aspire to college than predicted, whereas those from low SES families might become less likely to aspire to college than predicted. Absent beliefs favoring college, parent pressure may thus act as a substitute for such beliefs. This raises the question which group privately holds unfavorable views of college.

Grade Average

One such group comprises students with low grades who are much more pessimistic about college. They are more pessimistic about enjoying college, finding an enjoyable job afterwards and graduating, that is about the most relevant aspects when considering alternative career tracks. In line with this, I find that low-performing high SES students seem to increase their college aspirations the most as a reaction to increased parental pressure (see figure 2.12). For high SES students, the relationship between grades and college aspirations thus becomes weaker in the *public* condition. For low SES students, on the other hand, this relationship becomes slightly stronger.

As a result, the *public* condition particularly widens the socio-economic gap for low-grade students. The same pattern can be observed in the NEPS data for actual college attendance (see Appendix figure B.1 and table B.2), implying that students' adjustment to parents might drive the pronounced socio-economic gap for students with low grades. A possible interpretation of this pattern is that low-performing students from high SES families are not excited about going to college, but their college-educated parents steer them towards college nevertheless. Figure 2.12 is consistent with this interpretation. High SES parents are much more likely to state college as aspiration for their children with low grades than the children themselves or parents in low SES families. High SES students with mediocre grades thus appear

both likely to hold different aspirations than their parents and willing to adjust when aspirations are made visible to parents.

Gender and Agreeableness

The longitudinal data from the NEPS (see table B.1) suggests that daughters might put a higher weight on parents' aspirations relative to their own aspirations than sons. The patterns in my field experiment are in line with this interpretation, as the *public* condition increases the socio-economic gap more for participating girls than it does for boys (see figure B.11). Consistent with these findings, daughters also put a higher weight on their parents' opinion when it comes to making a career choice. As part of the background survey, I asked participants how many points (out of 100) they would put on their parents' opinion when they could allocate 100 points between their own opinion and their parents' opinion. While sons allocated an average 34 points to their parents' opinion, girls chose 42 points, a significant difference of 0.32 standard deviations. Moreover, 28% of girls put a higher weight on their parents' opinion than on their own, but only 16% of sons do so.

Girls may thus adjust more often to their parents because they are more willing to adjust or because they are more perceptive of their parents' preferences than boys, or both. Students' answers on the background survey provide evidence that both might matter. Girls more often indicate that their parents are considering a career option for them they do not like themselves (26% vs. 18%). Girls also score much higher than boys on agreeableness in the personality test – by 46.7% of a standard deviation. Maybe the desire to avoid conflict matters in adjusting to one's parents and offers an explanation for the observed gender differences. Breaking up the adjustment by agreeableness shows similar heterogeneous effects as when comparing girls and boys (see panel b) of figure B.11).⁴³

Migration Background

A group that perceives more disagreement with their parents are students with two parents of migration background. They are more likely to report that parents have other preferred majors or occupations for them in mind that they do not like themselves (32% among them compared to a baseline of 20%). They also more often say they would like to do something their parents do not approve of (27% among them vs. 17% among students with both parents born in Germany). Alone 12% among

⁴³Agreeableness is one of the five personality traits measured in the Big Five Inventory (Soto and John (2017)) and associated with a heightened desire for harmony and social approval. I classify students as “agreeable” if they score above the median for agreeableness on the Big Five Inventory.

them state that their parents would like them to pursue medical studies although they are not interested in doing so. In addition, these students also put significantly higher weights on parents' opinion than others. While others would put an average weight of 38% on their parents' opinion, they state an average of 51% (a difference of half a standard deviation). A share of 40% puts more weight on their parents' opinion than on their own, compared to 20% among all others.

Unfortunately, I do not have enough participating parents from families where both parents migrated to Germany to analyze differences in plans between the *private* and *public* condition for their children. The patterns above suggest, however, that parent-child-dynamics might be of tremendous importance for the career trajectories of these students.

2.8 Conclusion

While there has been extensive research into the reasons behind intergenerational mobility, there is still considerable uncertainty about its underlying causes. This paper tests for parent pressure as a mechanism behind socio-economic gaps in college attendance by eliciting high school students' career plans under experimentally varied degrees of parental pressure. I find that students' adjustment to parental pressure more than doubles the socio-economic gap in college plans to 27 percentage points. Estimating a structural model of career choice, I find that parental pressure and students' beliefs and preferences together explain 89% of the observed gap in college plans, in almost equal parts. Moreover, students' and parents' beliefs are strongly correlated, suggesting that parents' preferences and beliefs shape students' choices in at least two ways, both indirectly via the transmission of preferences and beliefs, and directly through students' adjustment to parents' preferences.

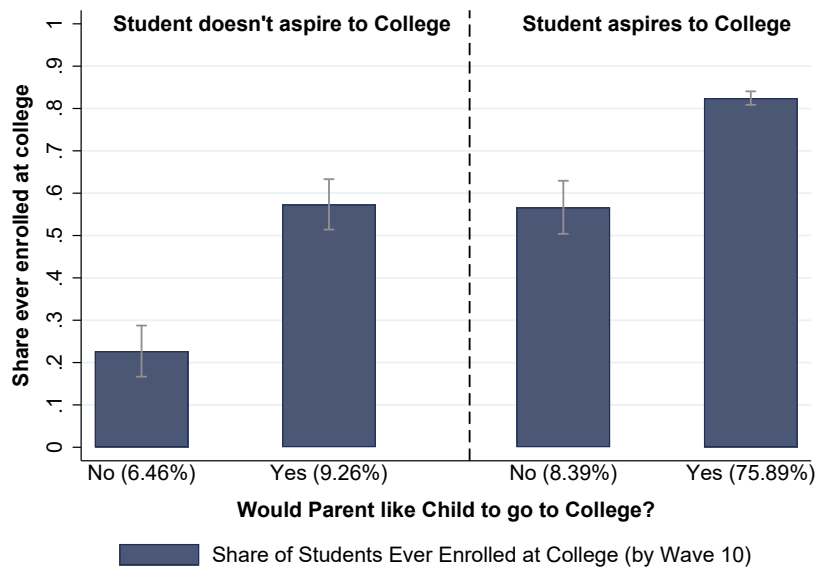
These results have several implications. They suggest that narrowing socio-economic gaps might require addressing parents' beliefs and preferences (List, Pernaudet and Suskind, 2021; Dizon-Ross, 2018) or creating additional support networks such as mentoring programs (Falk, Kosse and Pinger, 2020; Resnjanskij et al., 2021). Moreover, they also imply that leveling the playing field in terms of available resources and possibilities does not guarantee students from different backgrounds will make the same decisions (Heckman and Landersø, 2021).

A crucial question for future research is, when is parental influence on career choices good and when is it bad? The answer depends on how informed parents' preferences and beliefs are relative to those by their children. This might differ widely across households. The framework in this paper provides a starting point to analyze such nuanced differences of parental influence in the future and shows that

parental pressure across many families has the power to shape society-wide outcomes like intergenerational mobility.

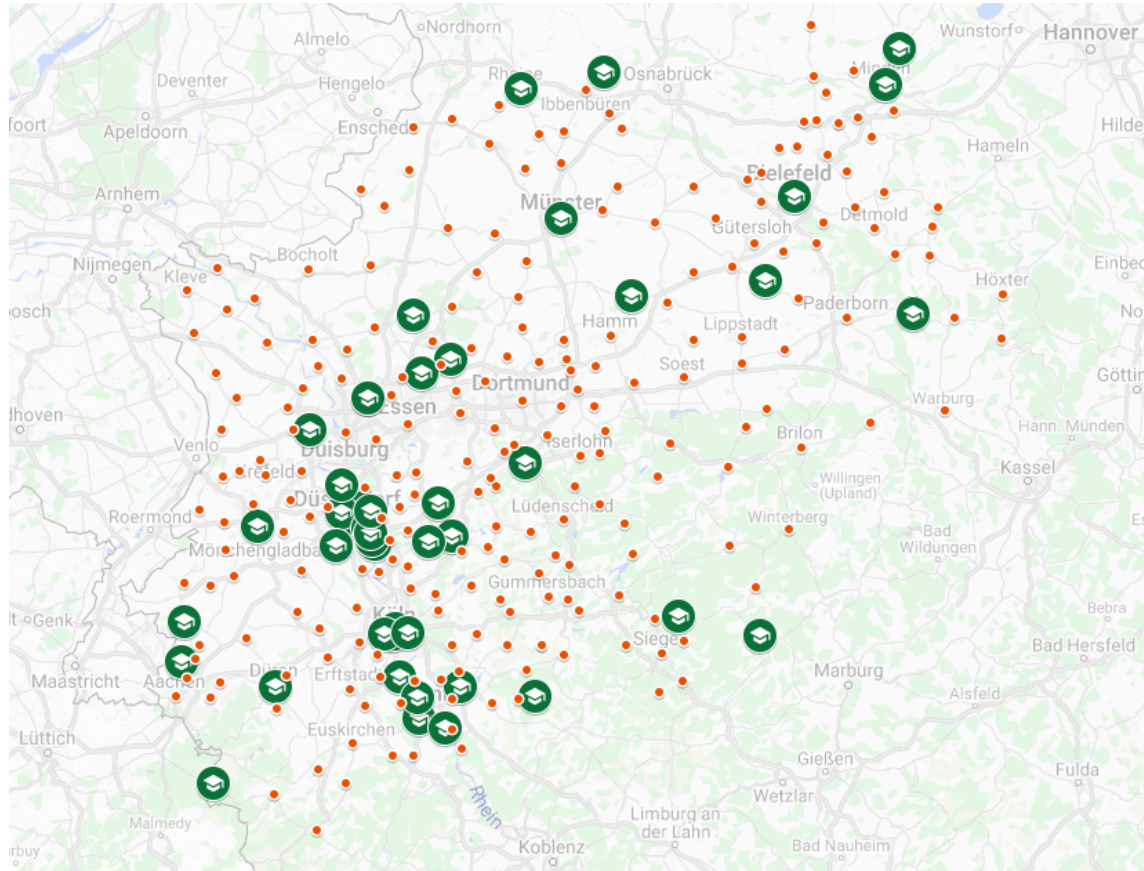
2.9 Figures

Figure 2.1: Students' actual college attendance conditional on students' and parents' college aspirations



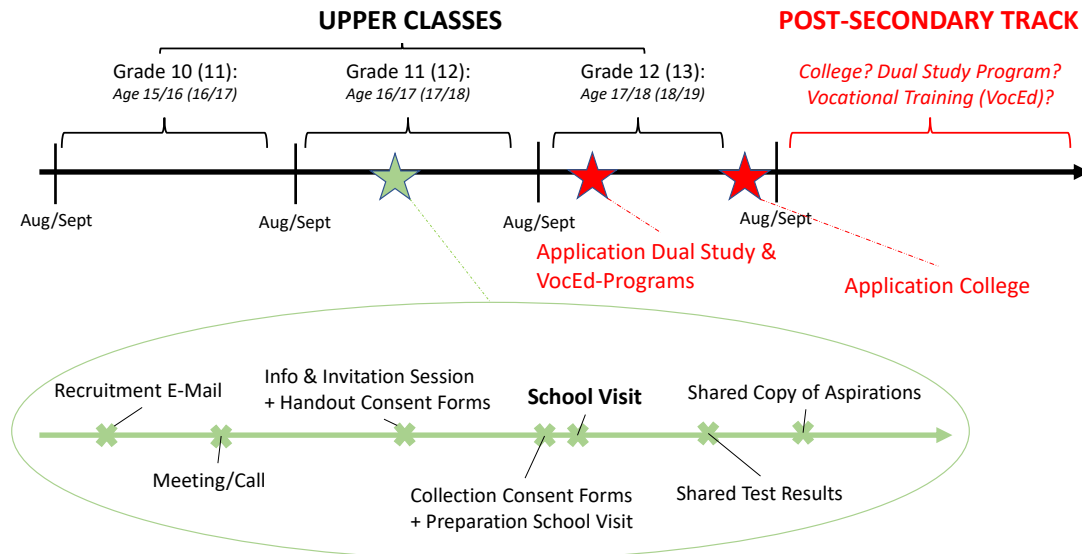
Notes: This graph is based on 2,862 observations from the NEPS. The y-axis reports the share (and the 95 percent confidence intervals) of students ever attending college after having finished high school in waves 9 and 10 of cohort 4 of the NEPS dataset. A student (parent) is coded as aspiring to college if (s)he indicates such an aspiration in either wave 5 or 7 while being in the upper classes at high school.

Figure 2.2: Location of Participating Schools



Notes: The map shows the state of North Rhine-Westphalia and the location of the 47 participating schools (green symbols) as well as localities where no school participated (red dots), but where there was at least 1 eligible school that was contacted. North Rhine-Westphalia is Germany's most populated state with a population of almost 18 million inhabitants, hosting 30 of the 81 biggest German cities. The metropolitan area "Rhine-Ruhr" along the two rivers of the same name is one of the World's largest metropolitan areas, where 10.5 million inhabitants and thus the majority of North Rhine-Westphalia's inhabitants lives. While participating schools span the whole area of North Rhine-Westphalia from south to north and east to west, most participating schools are from the "Rhine-Ruhr" area as can be seen from the cluster of schools stretching from Bonn over Cologne, Düsseldorf and Duisburg to Essen.

Figure 2.3: Timeline of Upper Classes, Postsecondary Career Choices and School Visits

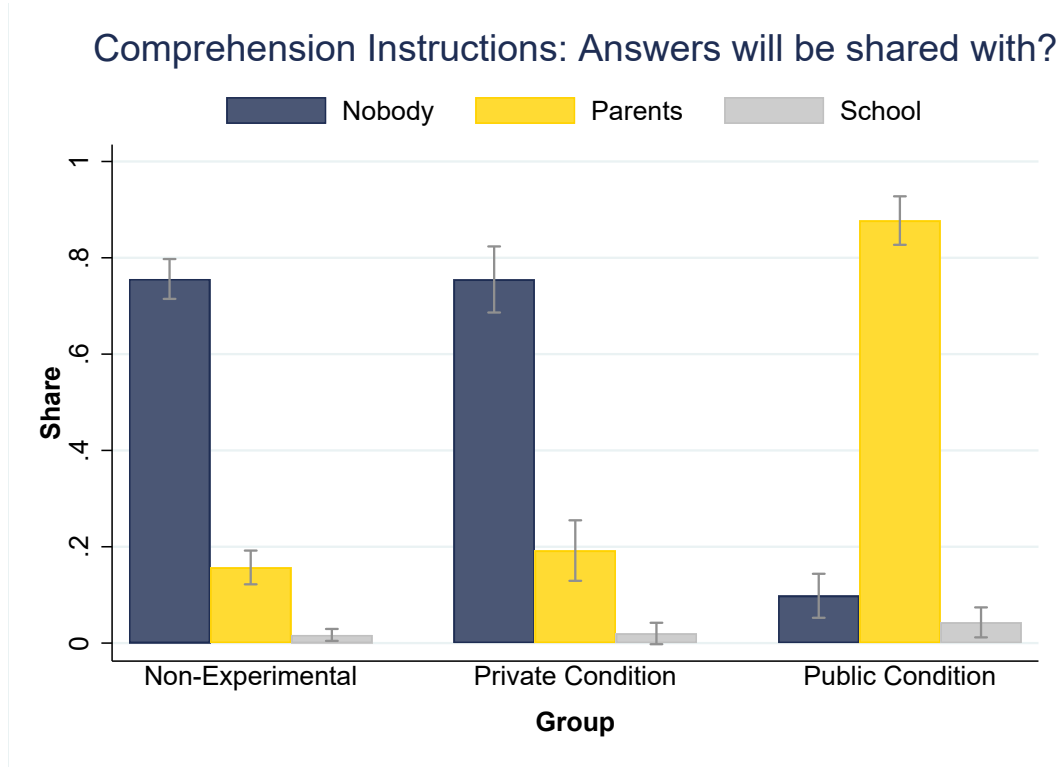


Notes: This figure shows the timing of most school visits against high schools' upper classes with grades and typical ages of students for Gymnasien (and Gesamtschulen in brackets) and the start of most postsecondary career tracks. While students at Gymnasien currently finish after 12 years and upper classes are thus from grade 10 through grade 12, at Gesamtschulen you graduate after 13 years of schooling with upper classes comprising grades 11 through 12. Graduates at Gesamtschulen therefore tend to be one year older than their counterparts at Gymnasien, turning 18 already in their penultimate year of high school rather than in their last year of high school.

August/September of a year typically marks the start of a school year, with most vocational programs after high school also starting around this time and most university programs starting in September or October of the same year. Typical application deadlines for dual study and vocational training programs are between August of the year before starting the program and January/February of the same year. Applications for most college programs are not due until mid-July, and for some programs applications are not necessary at all and enrolling until sometime in October/November is sufficient.

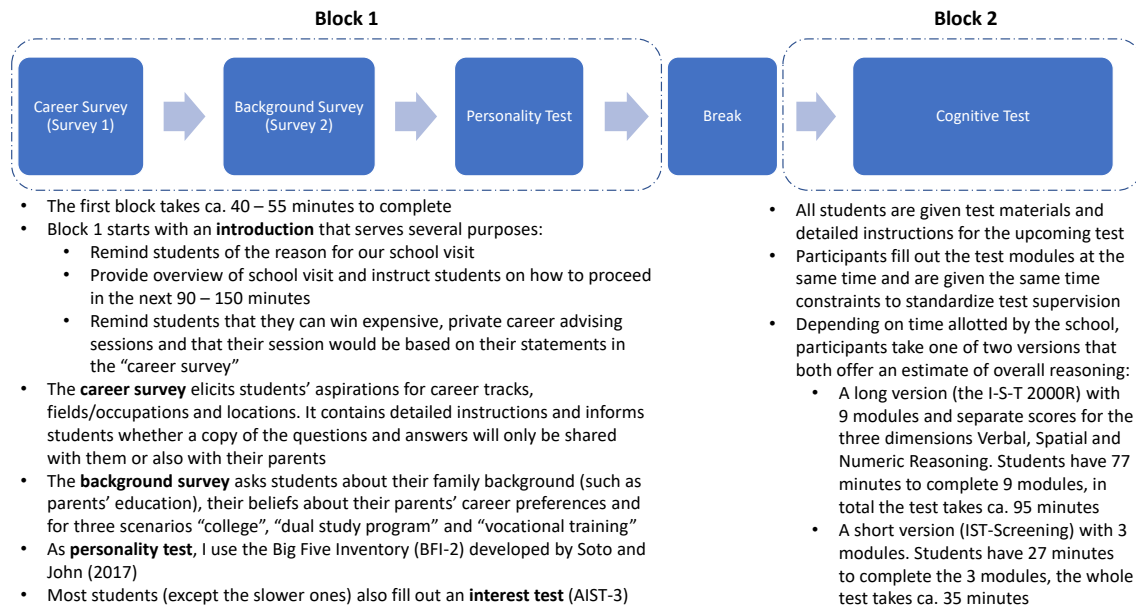
Most of the students participated when they were in their penultimate year of high school (represented by the green star). The figure also zooms into steps in preparation and when following up with the school visits, from the recruitment e-mail to the principal and teachers responsible for the career planning curriculum at the beginning to sharing students' stated aspirations with them several weeks after the school visit.

Figure 2.4: Understanding of Experimental Instructions



Notes: The data shown here comes from a sub-sample of 741 students participating in the field experiment who were asked the following comprehension question after having seen the instructions: “who except you will we share your answer with?” Available options to check were “Nobody”, “Parents” and “School”. Students were not required to answer this question and as such, the shares for each group do not have to add up to 100%. On the x-axis, I distinguish between three groups: “non-experimental” are all those students for whom I do not randomize the instructions (e.g. because none of their parents is participating or they did not indicate contact details separate from their parents. “Control” are those who received the private instruction at random and “Treatment” are all those in the public condition.

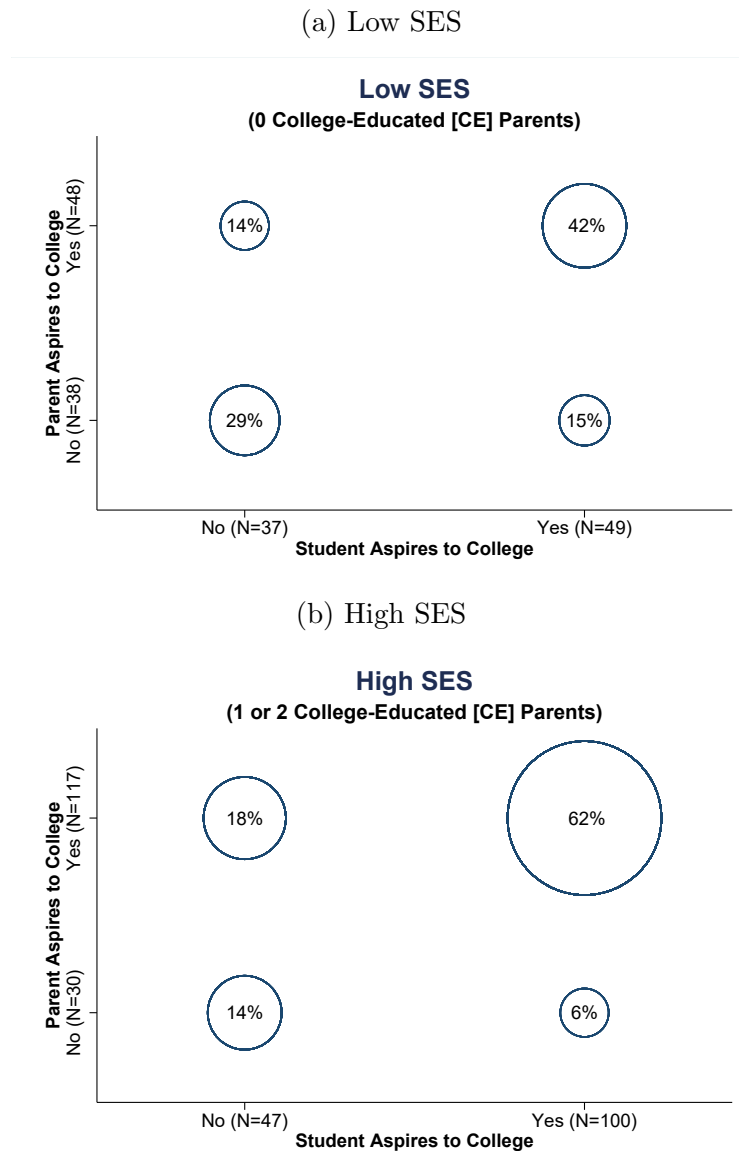
Figure 2.5: School Visits: Format of the Career Planning Module (components & procedure)



Notes: I developed both the career survey and background survey. The personality test is adopted from the German version of the Big Five Inventory (BFI-2) developed by Soto and John (2017). Licenses for both versions of the cognitive test (I-S-T 2000R and IST-Screening) as well as the interest test (AIST-3) were purchased in bulk from the Hogrefe Testzentrale. Schools were free to choose between the long format and the short format of the cognitive test, which mostly depended on how much time they were willing to grant me in total (and whether they wanted their students to get a brief glimpse in this type of test or a more detailed and more challenging version of such tests, as often encountered in assessment centers or career advising sessions). Registered parents received the invitation to fill out their survey while their children were working on block 1. They receive up to 6 reminders within the next 2 weeks to take the survey.

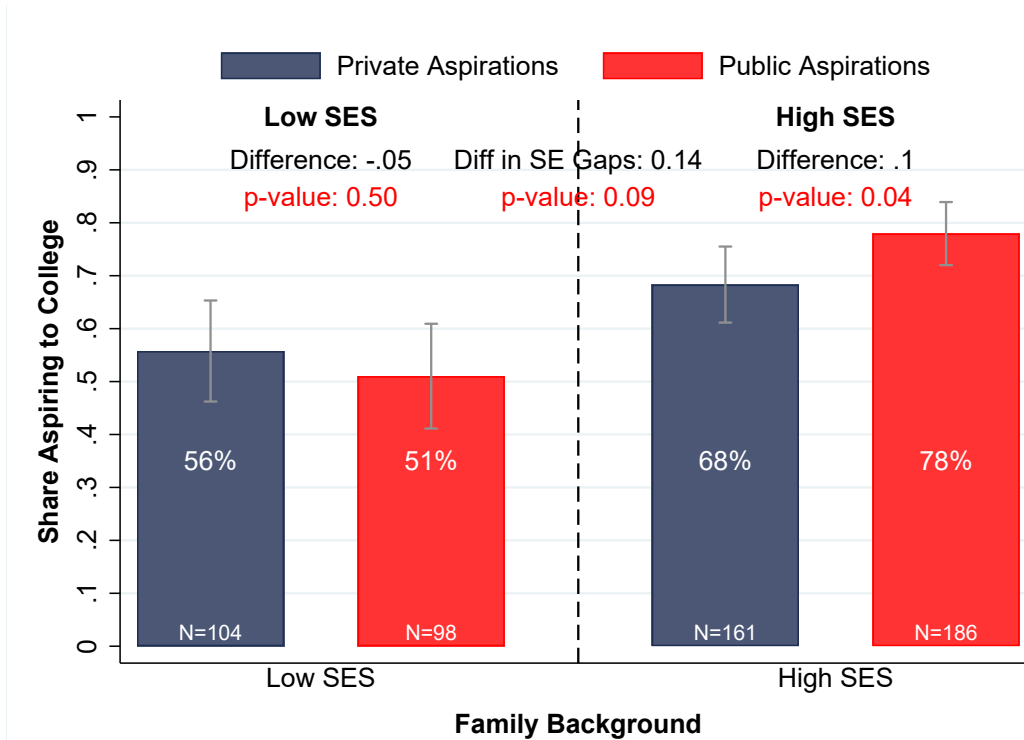
For the shift to the online format, I kept the overall structure of two blocks and made the following adjustments: students would start with the interest test and then complete the remaining surveys and tests in the same remaining order. After finishing block 1, students could choose between the short and long version of the test. If they chose the short version, they could choose when to take the test (including immediately after completing block 1). If they chose the long version, they had to book an appointment to take the test with remote instruction and supervision. In the online format, parents were only invited to fill out their survey after their children had completed block 1.

Figure 2.6: Students' vs. Parents' *Private* College Aspirations: Shares of Agreement & Disagreement



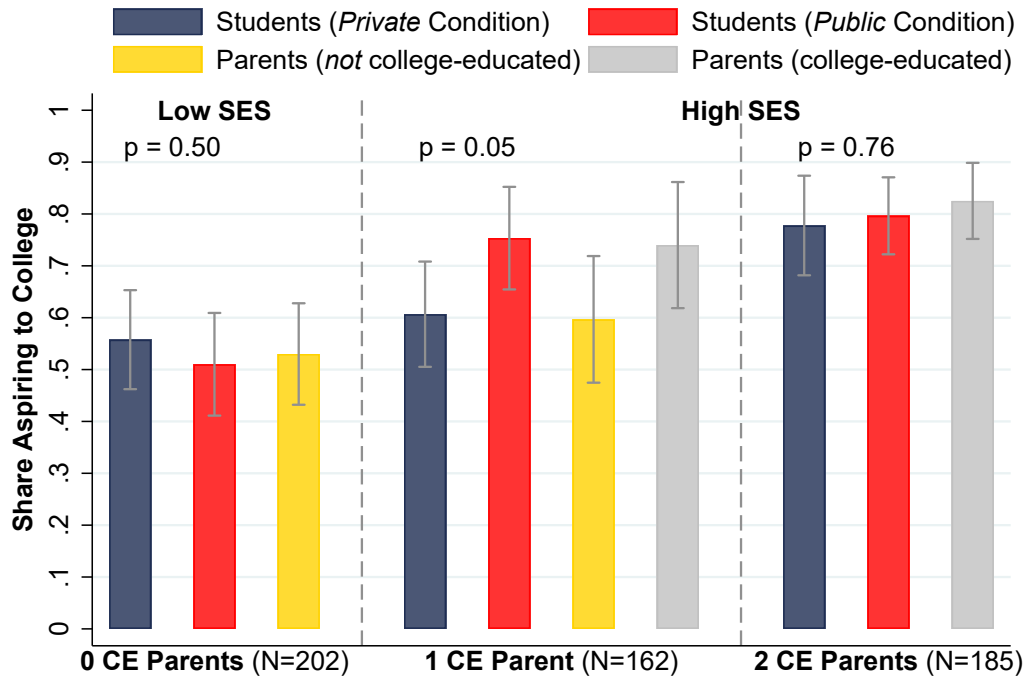
Notes: This figure shows the share of observations in agreement and disagreement with their parent(s) with respect to aspiring to college or not. It is based on 233 students in the *private* condition of the visibility experiment who had at least one parent participate and fill out their aspirations for their children. The x-axis indicates whether students stated an aspiration to attend college or not, the y-axis indicates the equivalent for their parents. If two parents participated and one of them stated an aspiration for their child to attend college, this would take the value “yes”. It is based on asking parents about their preferred option(s) for their child, without offering them the option of leaving it to the child. Panel a) and b) distinguish between children without any college-educated parent (“low SES”) and children with at least one college-educated parent (“high SES”). These are 86 students from low socio-economic background and 147 from high socio-economic background.

Figure 2.7: Private and Public College Aspirations by SES



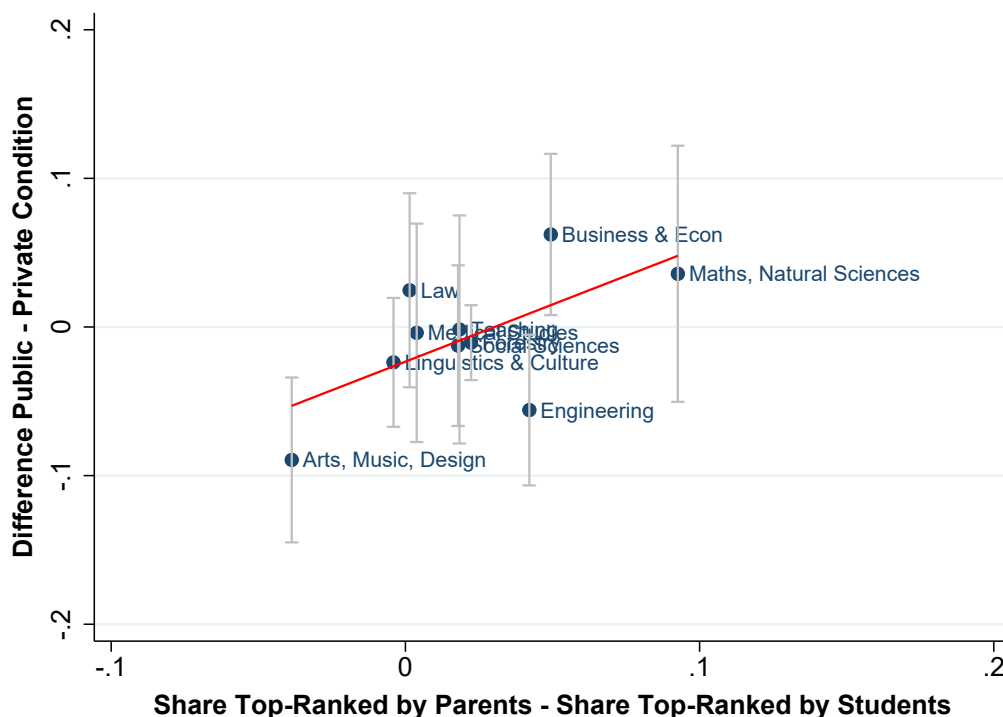
Notes: This figure presents the means and the 95 percent confidence intervals of the share of students aspiring to university in the private and the public condition, separately for students without any college-educated parent on the left side (termed “low SES (0 CE Parents)”) and students with at least one college-educated parent on the right side (termed “high SES (≥ 1 CE Parents)”). The graph is based on 549 students in the visibility experiment, of which 202 do not have any college-educated parent and 347 have at least one college-educated parent. The graph reports the p-value of the pairwise difference between the shares in the private and the public condition for low and high SES students as well as the p-value of the difference in the socio-economic gaps. The reported p-value corresponds to the p-value for the coefficient of β_3 as obtained from the following regression: $\text{College Aspiration}_i = \beta_0 + \beta_1 \text{High SES}_i + \beta_2 \text{Public}_i + \beta_3 \text{High SES} \times \text{Public}_i + \epsilon_i$. The estimation uses robust standard errors. More detailed results are reported in Table 2.2.

Figure 2.8: Student and Parent Aspirations by Number of College-Educated Parents



Notes: This figure presents the means and the 95 percent confidence intervals of the share of students aspiring to university in the private and the public condition, separately for students by the number of their college-educated parents (none, one or two). The figure also presents the means and the 95 percent confidence intervals of the share of parents aspiring to university in the private condition (when leaving it to one’s child was not an option), distinguishing between parents without and with college education. The graph is based on 549 students part of the visibility experiment and 314 parents with a child part of the visibility experiment and in the private condition. 202 students have zero college-educated parents, 162 have one college-educated parent and 185 have two college-educated parents. These numbers are 100, 111 and 103 for the participating parents in the private condition, with those in the “1 CE Parent” households being 62 without college education and 49 with college education. The p-values reported stem from pairwise comparisons between students in the private and public condition for the different family backgrounds.

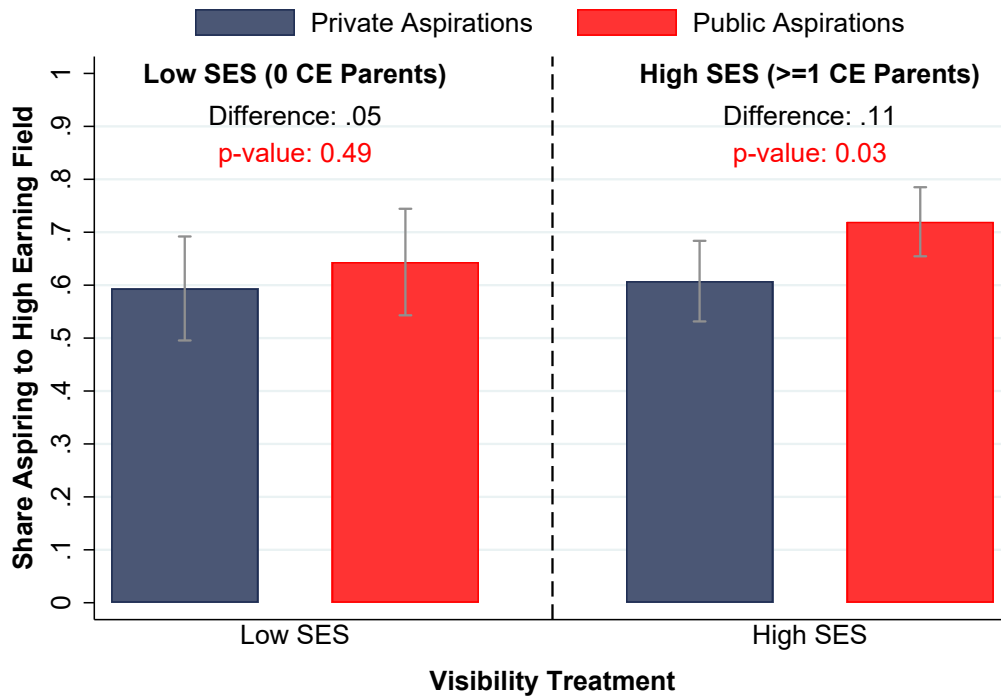
Figure 2.9: Visibility Experiment: Preferred Fields



Notes: This figure presents the relative disagreement between parents and students about different fields in the private condition (on the x-axis) and the difference between students' preferences for these fields in the public vs. the private condition (on the y-axis). The values on the x-axis display the difference between the share among parents in the private condition who rank a certain field top and the share among students in the private condition who rank the same field top. Students statements are more often single-peaked than parents such that most fields show a positive number. Nevertheless, the ordering is informative about the relative ranking of fields among parents vs. students. The y-axis displays the coefficient of regressing a dummy for ranking a given field top on a dummy for being in the public condition and the 95 percent confidence interval (based on robust standard errors). The regression line reports the results from regressing the coefficient on public on the difference in shares among parents minus students ranking a certain field top. The positive relationship indicates that an increased (lower) share of students report aspirations for those fields that parents find relatively more (less) attractive than students.

The data is based on asking students and parents to rate the attractiveness of ten fields on a scale from 0 points ("completely unattractive") to 100 points ("extremely attractive") and then assigning the dummy of being top-ranked to all fields receiving the student's or parent's highest rating. The ten fields are the following: "Agriculture and Forestry"; "Arts, Music, Design"; "Education"; "Linguistics and Culture"; "Social Sciences"; "Business and Economics"; "Engineering"; "Maths, Natural Sciences"; "Law"; "Medical Studies". 254 Students part of the visibility experiment gave their ratings for different fields in the private condition and 289 Parents with a child part of the visibility experiment and in the private condition did so. The coefficients for the difference between the public and private conditions is based on 523 students part of the visibility experiment who rated the fields in terms of their attractiveness.

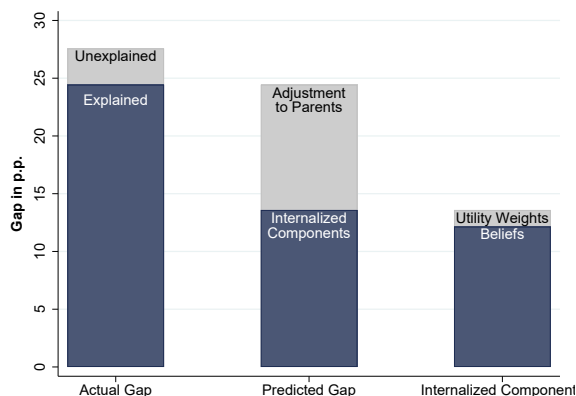
Figure 2.10: Visibility Treatment: Preferences for high earning fields by family background



Notes: This figure presents the means and the 95 percent confidence intervals of the share of students aspiring to a high earning field in the private and the public condition, separately for students without any college-educated parent on the left side (termed “low SES (0 CE Parents)”) and students with at least one college-educated parent on the right side (termed “high SES (≥ 1 CE Parents)”). The graph is based on 523 students in the visibility experiment who did rate the attractiveness of different fields. 183 students in this group do not have any college-educated parent and 340 have at least one college-educated parent. The graph reports the p-value of the pairwise difference between the shares in the private and the public condition for low and high SES students. The dummy for aspiring to a high earning fields takes the value of 1 if a student aspires to one of the five fields with the highest average earnings among graduates of the respective field. The five fields with the highest average earnings among graduates are the following: “Business and Economics”; “Engineering”; “Maths, Natural Sciences”; “Law”; “Medical Studies”. Accordingly, the five fields with relatively lower earnings are: “Agriculture and Forestry”; “Arts, Music, Design”; “Education”; “Linguistics and Culture”; “Social Sciences”.

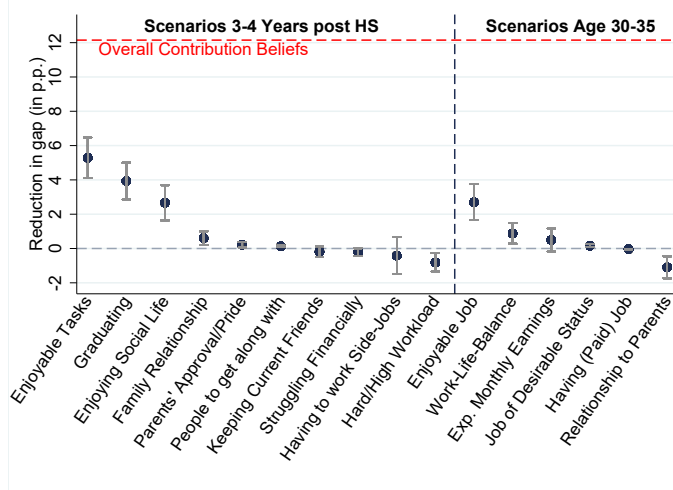
Figure 2.11: Structural Estimation: Core Results

(a) Decomposition of the socio-economic gap in (visible) college aspirations



Notes: This figure reports the decomposition of the socio-economic gap in college aspirations. The left bar compares the overall gap to the predicted gap by the model. The middle bar decomposes the latter into the components “adjustment to parents” and “internalized components”. The right bar reports the decomposition of the internalized components into utility weights and beliefs. The y-axis represents the size of the gap and each component’s contribution to the gap.

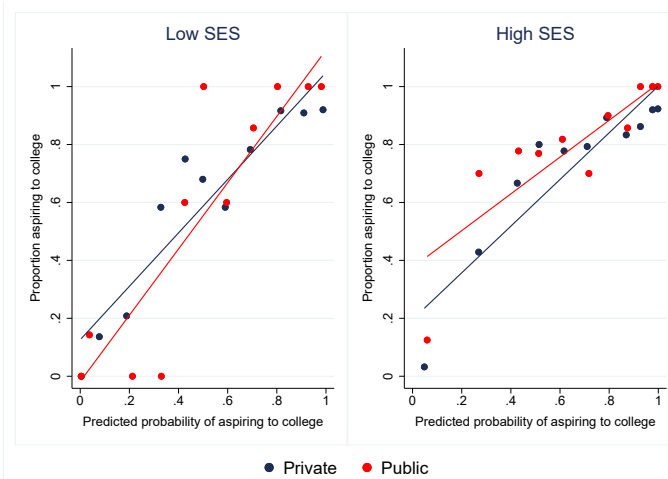
(b) Equipping low SES students with beliefs of high SES: Simulations



Notes: This figure reports the contributions of individual beliefs to closing the socio-economic gap. Positive (negative) values indicate a closing (widening) of the gap. The contributions are estimated by replacing low SES students’ belief distribution for one aspect such as “graduating” with the distribution of beliefs among high SES students (for undergraduate studies, dual studies and vocational training). Since there are fewer low SES (N_L) than high SES students (N_H), I draw 100 random samples of N_L students from the pool of high SES students. Each individual simulation then sorts low and high SES students by their predicted probabilities of aspiring to college and replaces the n^{th} ranked low SES student’s beliefs by the n^{th} ranked high SES student’s beliefs. The confidence intervals are based on bootstrapped standard errors from 100 repetitions.

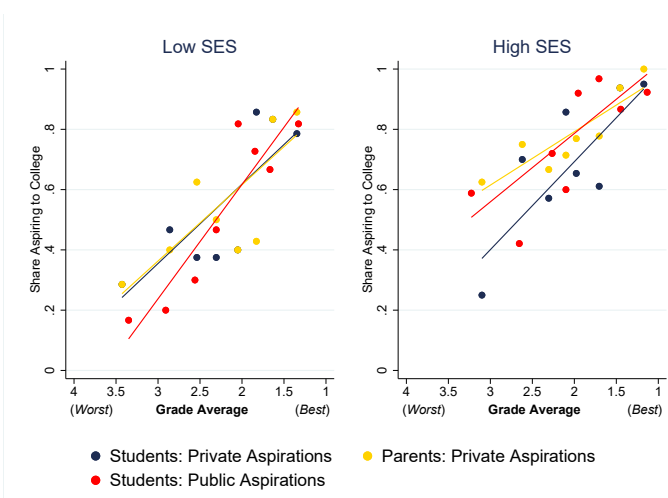
Figure 2.12: Heterogeneities in Adjusting to one's Parents

(a) Subjective Beliefs: College Aspirations in the Public Condition against Predicted Probability to aspire to college



Notes: This figure shows bin-scatterplots of the share of students aspiring to college as a function of students' predicted probability of aspiring to college. The predicted probability is obtained by first estimating the baseline model that only incorporates students' subjective expectations and then calculating the predicted probability based on each individual's beliefs.

(b) Grades: Students' Private & Public vs. Parents' Private Aspirations against students' grade average



Notes: This figure shows bin-scatterplots of the share of students and parents aspiring to college as a function of students' reported grade average, for both students without any college-educated parents on the left side and students with at least one college-educated parent on the right side. Passing grade averages in Germany range from 4.0 to 1.0, with lower grades representing better grades. The median grade average in my overall sample is 2.2. 524 students in the visibility experiment reported their own grade average such that the left graph is based on 185 students and the right graph on 339 students.

2.10 Tables

Table 2.1: Descriptive Statistics for Schools, Students and Parents

Panel A: Schools						
	All	Gymnasien	Gesamtschulen			
N	47	35	12			
Urban	33	25	8			
Participants	1,195	836	359			
Part of Experiment	549	430	119			
Grade Average	2.21	2.12	2.45			
% Participants High SES	0.52	0.64	0.26			
% Migration Background	0.37	0.28	0.55			
% at least 1 Parent Registered	0.57	0.65	0.39			
Panel B: Students						
	All	Part of Experiment?		Treatment Group?		Balance
		No	Yes	Private	Public	p-value
N	1,195	646	549	265	284	
Male	0.39	0.38	0.39	0.41	0.38	0.43
Penultimate Year	0.71	0.74	0.68	0.67	0.69	0.52
Ultimate Year	0.16	0.18	0.14	0.13	0.14	0.79
Grade Average	2.21	2.33	2.09	2.12	2.06	0.25
# Registered Parents	0.81	0.30	1.40	1.40	1.40	0.91
Registered Mom	0.52	0.19	0.88	0.89	0.88	0.70
Registered Dad	0.33	0.13	0.56	0.55	0.57	0.47
High SES	0.52	0.43	0.63	0.61	0.65	0.27
≥ 1 Immigrant Parent	0.37	0.49	0.22	0.20	0.24	0.18
2 Immigrant Parents	0.23	0.34	0.11	0.10	0.11	0.62
Panel C: Parents						
	All (N=819)					
Female	0.64					
College-Educated	0.52					
0 CE-Parent HH	0.31					
Non-CE in 1 CE HH	0.16					
CE in 1 CE HH	0.13					
2 CE Parents	0.39					
Immigrated	0.13					

Notes: Panels A to C report key variables for participating schools, students, and parents. Panel A breaks down information by the two type of schools *Gymnasien* and *Gesamtschulen*. Panel B provides information on all students, by their status of being part of the experiment, and by being in the *private* or the *public* condition in the visibility experiment. The right column under “Balance” reports the p-value for the difference between the *private* and the *public* condition. The p-value (under robust standard errors) is obtained by regressing the respective variable on being in the *public* condition while controlling for school fixed effects (given randomization at the individual level within schools). Panel C provides statistics on participating parents.

Table 2.2: The Visibility Experiment: The Effect on College Aspirations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Dependent Variable: Indicator for Aspiring to College									
<i>Public</i> Condition	.05 (.04) [.05]	.06 (.04) [.05]	-.05 (.07) [.08]	-.05 (.07) [.09]	-.05 (.07) [.08]	-.05 (.07) [.09]	-.1 (.08) [.1]	.11** (.05) [.06]	.15* (.08) [.08]	.04 (.06) [.07]
High SES			.13** (.06) [.07]	.01 (.07) [.08]						
<i>Public</i> x High SES			.14* (.09) [.09]	.16* (.09) [.09]						
1 College-Educated (CE) Parent					.05 (.07) [.07]	-.03 (.08) [.08]				
2 CE Parents					.22*** (.07) [.07]	.07 (.08) [.08]				
<i>Public</i> x 1 CE Parent					.19* (.1) [.1]	.2* (.1) [.11]				
<i>Public</i> x 2 CE Parents					.07 (.09) [.08]	.12 (.09) [.09]				
Mean (<i>Private</i>)	.63	.63					.56	.68	.61	.78
Mean Low SES (<i>Private</i>)			.56	.56	.56	.56				
Sample			All				Low SES	High SES	1 CE	2 CE
N	549	549	549	549	549	549	202	347	162	185
R^2	0	.13	.05	.14	.06	.15	.18	.15	.22	.24
School-FE	NO	YES	NO	YES	NO	YES	YES	YES	YES	YES

Notes: This table presents the results of OLS regressions of a dummy variable for students' stated college aspirations on being part of the *public* condition (for all columns), and on being from a high SES family and the interaction term of the two (for columns (3) and (4)). Columns (5) and (6) instead include indicators for having 1 or 2 College-Educated Parents and interaction terms of these with being in the *public* condition. Finally, columns (7)-(10) report the effect of being in the *public* condition for the 4 groups of low SES students (those with 0 College-Educated Parents), high SES students, students with 1 College-Educated Parent and students with 2 College-Educated Parents. Columns (2), (4), (6) and (7) to (10) include school fixed effects. Robust [school-level clustered] standard errors are reported in parentheses [brackets] below coefficients, *** $p < .01$, ** $p < .05$, * $p < .1$.

Table 2.3: Maximum Likelihood Conditional Logit Estimates for Dependent Variable Aspiring to College, Dual Study Program or Vocational Training

	Low SES	High SES	High - Low SES
Exp. Monthly Earnings (in '000s €)	.21*** (.08)	.23** (.1)	.02 (.13)
Adjustment Utility College (λ_{College})	.06 (.51)	.98** (.49)	.93 (.71)
Adjustment Utility Dual ($\lambda_{\text{Dual Study}}$)	-.46 (.54)	-.44 (.58)	.02 (.79)
Enjoying Social Life	2.4** (.94)	1.37 (.96)	-1.03 (1.35)
Meeting People Gets Along With	.14 (1.11)	.8 (1.08)	.66 (1.55)
Maintaining Good Relationship w/ Family	1.79 (1.69)	5.24* (2.71)	3.45 (3.2)
Having Parents' Approval & Pride	.56 (1.22)	2.63* (1.39)	2.07 (1.85)
Maintaining Good Relationship w/ Friends	-.52 (.93)	-1.2 (1.39)	-.68 (1.68)
Finding Material/Tasks Exciting & Enjoyable	4.06*** (1.03)	3.72*** (1.18)	-.34 (1.56)
Finding " Too Hard/ Workload Too High	1.34 (.89)	.94 (.99)	-.4 (1.33)
Struggling Financially	.46 (.73)	-.84 (.87)	-1.3 (1.13)
Having to Work Besides Main Responsibilities	1.47*** (.47)	1.48*** (.45)	.01 (.65)
Finishing Program and Graduating	3*** (.88)	4.15*** (.92)	1.15 (1.27)
Having a (Paid) Job	-.07 (1.25)	.4 (1.4)	.47 (1.88)
Enjoying Job (Conditional On Having Paid Job)	3.74*** (1.25)	2.69* (1.4)	-1.05 (1.88)
Having Good Relationship to Parents in 30s	-2.95 (3.2)	-3.24 (3.54)	-.29 (4.77)
Combining Work and Social Life/ Family	2.23* (1.28)	-.12 (1.45)	-2.35 (1.93)
Achieving Job of Desirable Status	.23 (1.04)	4.02*** (1.31)	3.79** (1.67)
Observations	323	423	746
Mc-Fadden's Pseudo R^2	.47	.40	
Corr (y_{ij}, \hat{y}_{ij})	.79	.77	
Share correct predictions	.90	.90	
Adjusted share correct predictions	.73	.61	

Notes: This table represents the estimated conditional logit results (via Maximum Likelihood) - coefficients and standard errors in brackets - for both low and high SES students and the difference between the two. The rows indicate the estimated component. The estimated coefficients for the 15 scenarios represent the estimates of the utility weights in the model: $\Delta u_k(X_s)$. The share of correct predictions is given by $\frac{\text{Correctly Predicted Alternatives}}{\text{Overall Alternatives}}$, where any alternative with a predicted probability of .5 or higher is treated as taking the value of 1 and 0 otherwise. The adjusted share adjusts for the share of the most commonly chosen alternative (denoted by q): $\frac{\text{Correctly Predicted Alternatives} - q}{\text{Overall Alternatives} - q}$.

Table 2.4: Intergenerational Transmission of Beliefs: Perceived Returns to College vs. Vocational Training (Pooled Scenarios)

Dep. Variable: Students' Beliefs ($\pi_{s,college,k} - \pi_{s,VocEd,k}$)				
	All Parents	Mothers	Fathers	Both
Parent's Beliefs ($\pi_{p,college,k} - \pi_{p,VocEd,k}$)	.45*** (.03)			
Mother's Beliefs ($\pi_{m,college,k} - \pi_{m,VocEd,k}$)		.44*** (.03)		.32*** (.05)
Father's Beliefs ($\pi_{f,college,k} - \pi_{f,VocEd,k}$)			.48*** (.04)	.31*** (.04)
High SES	.04*** (.01)	.03** (.02)	.04** (.02)	.05* .03
Constant	-.01 (.01)	-.01 (.01)	-.02 (.02)	-.03 (.03)
N	7,526	4,627	2,809	1,470
R^2	.16	.16	.16	.23

Notes: Each column presents the results of a separate regression of students' perceived returns to college over vocational training ($\pi_{s,college,k} - \pi_{s,VocEd,k}$) on the perceived returns by their parents (column 1), their mothers (column 2), their fathers (column 3), or on both, their mothers and fathers (column 4) for those with both parents participating. For the purpose of these regressions, beliefs for all scenarios are pooled.

Chapter 3

Experimental Evidence on Selective Memory of Big Life Decisions using 10 Years of Panel Survey Data

3.1 Introduction

How do people learn from personal experiences? A growing literature shows that motivated cognition can drive what people learn or do not learn from personal experience and feedback (Bénabou and Tirole, 2016). Evidence suggests that systematically biased beliefs can arise from biased belief updating (Eil and Rao, 2011; Mobius et al., 2011), information avoidance (Oster, Shoulson and Dorsey, 2013; Gottlieb, 2014) and selective memory (Zimmermann, 2020; Huffman, Raymond and Shvets, 2019; Chew, Huang and Zhao, 2020). As hypothesized by Bénabou and Tirole (2002), people are not only susceptible to mechanical distortions of memory (Mullainathan, 2002; Bordalo, Gennaioli and Shleifer, 2017; Enke, Schwerter and Zimmermann, 2020), but might actively use selective memory to achieve desirable beliefs. However, while most personal experiences span years, most studies on motivated reasoning are over short time horizons and typically based on lab experiments in high-income countries. An open question is, do these findings of biased and motivated memory extend to long-term memory of important life experiences in the field and to low-income countries?

In this paper, I study selective memory of personal experiences in the context of fertility desires and outcomes over the span of a decade. The paper also examines the

implications of motivated memory for the reliability of retrospective survey questions. For these purposes, I provide field evidence on the evolution and memory of fertility desires and actual fertility for a sample of 3,928 Kenyan women and men over ten years from their early twenties on. I combine data from two survey rounds a decade apart that are part of a larger panel study following an initial deworming study by Miguel and Kremer (2004).

In the panel, respondents were first asked about their desired number of children and their current number of children when they were around 22. They were asked the same questions ten years later such that I can compare their current desires and number of children to their past desires. In addition, respondents were asked to recall how many children they desired when they were interviewed ten years ago. To examine whether inaccurate recall is due to insufficient effort or respondents' inability or unwillingness to recall their past desires, I randomized whether respondents were given monetary incentives to recall their past fertility desires (Zimmermann, 2020; Huffman, Raymond and Shvets, 2019). Finally, I offered respondents the opportunity to find out how many children they desired ten years ago and randomized whether this offer was coupled with monetary incentives to take up the information. This variation provides a test of whether respondents find certain memories undesirable.

This paper makes six contributions. First, I document that changing one's reproductive desires over ten years is the norm rather than the exception in this context; 73% changed their desires, 30% of them by two children or more. Upward revisions occur for 54% and downward revisions for 18% of respondents. Moreover, 34% of women and 24% of men have more children than desired ten years ago. Another 27% (20%) of women (men) have reached their desired family size, with years of residual fertility ahead of them. These patterns illustrate why fertility in Kenya is a well-suited context to study how memory affects learning from experience in important life domains. First, desired and actual fertility can be compared across a large number of people because it is quantifiable, sufficiently standardized, and meaningful to everyone. Second, it provides continuous measures of desires and outcomes with extensive heterogeneity in both. Third, individuals have imperfect control over outcomes that are consequential and irreversible.

Second, I elicit respondents' recollections of their past fertility desires and find that 34% correctly remember their past desires, 44% overestimate, and 22% underestimate their past desires. I estimate that, on average, recalled desires are a convex combination of current and past desires, with a weight of only 40% on true past desires. Memory is biased towards current desires and particularly so for those with excess fertility, i.e. with more children than once desired: they are 13 percentage points less likely to correctly remember their past desires than those without excess fertility.

Third, I report on the experiments I designed to estimate the mechanisms behind biased memory. I find evidence consistent with selective forgetting and information avoidance. Financial incentives improve memory of past fertility desires for those without excess fertility, but not for those with excess fertility. This asymmetry is specific to the context of fertility since financial incentives improve memory equally for both groups on a neutral recall question to remember Kenya's vice-president ten years ago. This is not caused by a lack of effort, as both groups spend more time thinking about both recall questions when incentivized. Those with excess fertility cannot easily access their past desires and may have forgotten them.

Fourth, to study costly information avoidance I randomized whether respondents were offered information about their past desires with or without additional financial incentives to take up the offer. Financial incentives strongly increase take-up for those without excess fertility, but much less so for those with excess fertility. Respondents with excess fertility thus avoid information about their past reproductive desires despite foregoing money by doing so. This is especially pronounced for those who did not remember their past desires and those with many children, suggesting that biased memory and information avoidance are driven by related motives.

Fifth, I find that motivated forgetting increases with each birth of an initially undesired child and the years that pass afterwards. However, the more undesired children respondents have, the more they struggle to remember all of these children as desired. Additional time after the information offer also helps respondents with excess fertility to ignore the offer. These results complement those by Zimmermann (2020) and Huffman, Raymond and Shvets (2019), showing selective memory over shorter and longer time horizons of minutes and years.

Finally, I examine the relationship between distorted memory and the intergenerational transmission of fertility preferences. On average, overestimating past desires is associated with advising adolescents to have .56 children more than those not overestimating recommend. These recommendations are more strongly correlated with respondents' remembered desires than with their current desires, past desires and beliefs about local family size norms. Similar psychological concerns may thus shape both biased memories and advice.

The paper is most closely related to the literature on motivated reasoning, particularly to biased memory and belief updating.¹ It contributes by showing that motivated memory extends to important experiences in the field and in low-income countries. I find that memory of past desires is biased in the direction of life out-

¹Facing new information, people update asymmetrically (Eil and Rao, 2011; Mobius et al., 2011; Schwardmann and Van der Weele, 2019) or avoid the information altogether (Oster, Shoulson and Dorsey, 2013; Gottlieb, 2014).

comes and that this is partly motivated. This could lead people to overestimate how much control they have over their own lives and to underestimate the importance of external influences. Relatedly, selective memory has been shown to help with achieving desirable beliefs and suppressing unwanted memories (Anderson and Levy, 2009), but at the cost of accurate beliefs (Gödker, Jiao and Smeets, 2020). Selective memory has also been shown to help maintain (over-)confidence (Zimmermann, 2020; Huffman, Raymond and Shvets, 2019; Chew, Huang and Zhao, 2020), a positive self-image (Mischel, Ebbesen and Zeiss, 1976; Saucet and Villeval, 2019) and potentially optimism and mental health (Korn et al., 2014).

In addition, I also provide evidence for a potential implication of motivated memory. It might bias the advice people give.² This paper shows a case where biased advice is associated with biased retrospection, implying that such advice need not always be beneficial. Moreover, biased memory may lead younger generations to uphold existing institutions or norms. This could contribute to cultural persistence (Alesina, Giuliano and Nunn, 2013; Bisin and Verdier, 2001, 2011), groupthink in organizations (Bénabou, 2013), and the cultural transmission of traits (Dessi, 2008). In the extreme, it might lead to the persistence of harmful traditions like female genital mutilation (Gulesci et al., 2021) as those who underwent the traditional procedure act as its gatekeepers (Bellemare, Novak and Steinmetz, 2015).

Finally, the paper holds positive and negative news for survey design. The positive news is that survey panel data can be used to study selective memory as well as its determinants and implications. The growing availability and longevity of survey panels thus offers an opportunity to study memory in various contexts. The negative news is that selective memory can bias answers to retrospective questions and thus lead to biased results.³ This is important because many survey questions require some retrospection, e.g., an estimated 30% to 50% for the 2019 PSID survey. Many papers rely on retrospective data such as self-reported past earnings, for important topics like the returns to migration (Hendricks and Schoellman, 2018). To give an example, a retrospective question about past fertility desires, as in Demographic and Health Surveys (DHS), captures only 50% of those with actual excess fertility in my sample. This can also bias analyses of the determinants or correlates of excess fertility (Pritchett, 1994). Women in my sample are 8.9 percentage points (42%) more likely than men to have more children than desired, but the estimate based on DHS-type retrospective data is 12.5 percentage points (85%). Using panel data to document

²Advice from experienced individuals could be particularly helpful for big life decisions (Gilbert, 2009). These are costly to undo, infrequent with limited personal experience, but require forecasting of future state-dependent utility which people struggle with (Loewenstein, O'Donoghue and Rabin, 2003; Kuziemko et al., 2018).

³See De Nicola and Giné (2014) or Arthi et al. (2018) for examples of inaccurate recall data.

which types of questions suffer most from selective memory and testing for ways to reduce memory biases is thus an important step to improve survey methodology (Meyer, Mok and Sullivan, 2015).

The remainder of the paper is structured as follows. Section 2 introduces the panel data set and the context. Section 3 provides an overview of women’s and men’s changing fertility desires and family formation over time. I describe respondents’ memory of their past reproductive desires in section 4. Section 5 examines the mechanisms of memory, section 6 its dynamics. In section 7, I turn to the possible implications of biased memory.

3.2 Data and Context

In this section, I introduce the Kenyan Life Panel Survey (KLPS), the “recall module” embedded in the fourth survey round of the KLPS and the experimental survey components I use. The fourth survey round of the KLPS was launched in September 2018 and is almost completed. The Kenyan Life Panel Survey is a longitudinal dataset that contains educational, health, demographic, labor market, and other information for nearly 10,000 Kenyan adults, spanning from their time in primary school up through adulthood. The “recall module” asks respondents to remember information from the time of their survey during KLPS-2 that was conducted between 2007 to 2009, 10 or more years before their round 4 interview.

The sample of interest for this project are the 3,928 individuals who participated in survey round 4 (KLPS-4) and survey round 2 (KLPS-2) and have information on their reproductive desires in both rounds. These are 1966 women and 1962 men who on average are 33 to 34 years old at the point of interview (see table 3.1 for summary statistics). Respondents have about 3 children on average by survey round 4 and had about 2 children since survey round 2. At the time of survey round 2 when they were around 22 to 23, respondents had achieved ca. 8 years of schooling which corresponds to finishing primary school. In this sample, around half of all male and a third of all female respondents continued to secondary school. All respondents originally attended primary school in Busia, a densely settled farming region in western Kenya bordering Lake Victoria. Busia is somewhat poorer than the national average and so are the respondents’ median annual household earnings of around \$500 (2017 US-\$). The sample includes respondents who have migrated and left Busia since the initial studies.

The relevant part of the KLPS sample comprises individuals who participated in a previous randomized NGO program providing deworming medication to primary school students during 1998-2003 (known as the Primary School Deworming Pro-

gram, or PSDP; see Miguel and Kremer (2004) for the initial study of this program). This project focuses only on participants of the PSDP initially surveyed in KLPS-2 and again for the current survey round (KLPS-4). The second survey round (KLPS-2) tracked a representative subset of 7,500 children with an effective tracking rate of 82.5%. The I Module, the relevant part of the KLPS-4 round, was launched in September 2018 and collected information on a wide range of outcomes, including measures related to fertility, parenting, individual health and migration. While the main purpose of the I Module was to study the longer term impacts of the PSDP on now-adult beneficiaries, one section of it was dedicated to fertility, including a subsection around memory related to fertility.⁴

The Recall Module and its Experimental Design

For the purpose of this research project, the survey contains several questions around reproductive desires and their recall. Some of these questions are subject to experimental manipulations. These components are presented in figure 3.1. Henceforth, I will refer to this addition to the survey as “the recall module”.

The key survey and experimental design of survey round 4 relies on using data on stated fertility desires in round 2 (denoted x_2) to a) assess the accuracy of recalled fertility desires and b) offer information about past desires to respondents. To assess the accuracy of respondents’ memory, respondents were asked to recall how many children they desired in the year of their KLPS-2 interview (question “Recalled Fertility Desires”). The exact version of the question respondents were asked was experimentally randomized: 60% of respondents were not given monetary incentives to recall, 40% were given monetary incentives. Among those receiving monetary incentives, I varied whether respondents are promised 20 Kenyan Shilling (KES) or 40 KES for correctly remembering their past desires. 20 KES and 40 KES are equivalent to .2\$ or .4\$ or to one third and two thirds of median hourly earnings in the sample (see table 3.1). These incentives thus represent meaningful incentives to remember one’s past desires. Among those not given monetary incentives, respondents are asked one of three versions of the question. One open question on how many children they would have desired at the time (Control Version, 40% of observations), one version noting that their answer was recorded and thus stressing the memory task (“Reminder” Version, 10%) and one mentioning that it is normal to change one’s mind (“Psychological Statement” Version, (10%)). I use respondents’ recalled

⁴For more details on the I Module and its primary purpose, read Baird, Hicks and Miguel (2019).

desires together with their stated past desires to assess how recall accuracy varies depending on being offered monetary incentives or not.

The same subset of respondents were offered to find out about their past reproductive desires in round 2 as part of the “Information Offer”. Respondents were told about the offer at the end of the recall module and instructed that they would have the chance to privately look up their past answer on a tablet at the end of the survey, simply by reminding the field officer at the end of the survey. This offer is either only about the information (for 60% of respondents) or bundled with monetary incentives of KES20 (\$.2). In the latter case, respondents are told they were drawn in a lottery and will receive an additional KES20 if they remind the field officer that they want to look up their past answer. Respondents in KLPS-4 who were not interviewed in KLPS-2 are only offered the monetary incentives for reminding the field officer and are not promised any information.

Interviews as part of KLPS-4 were split into two representative waves of both ca. 4,000 individuals.⁵ The core questions above are asked in both waves, but some components between the recall module and the end of the survey were cut after wave 1 and for wave 2. This mattered for information take-up as I will point out in section 3.5. We expected about 4,000 respondents would be interviewed in total who were also interviewed for KLPS-2 and have reached 3,928 so far.

3.3 Individual Fertility Histories

How does women’s and men’s actual and desired fertility in their early- to mid-thirties compare to their desired number of children a decade ago? Using data from survey rounds 2 and 4 of the KLPS, I present three key patterns. First, changing one’s reproductive desires is the norm and not the exception. Second, upward revisions in the desired number of children are much more common than downward revisions over this time horizon. Third, excess fertility is widespread already and will only become more prevalent as most respondents have more than 10 fecund years ahead.

For the majority of women and men in this setting, desired fertility is subject to considerable change over time. These changes reflect both a general upward trend as well as individual variation in desired and actual fertility. Most respondents, 57% of women and 51% of men, now want more children than they did 10 years ago and only 27% (29%) of women (men) desire the exact same number of children as before. The joint distribution of women’s (men’s) desires in survey rounds 2 and 4 in figure 3.2a

⁵Wave 1 launched in September 2018 and ran through the end of 2019; Wave 2 was launched in 2020. Data collection had to be paused in March 2020 due to Covid-19, but continued with a few months delay.

furthermore shows that 30% of women or men to have changed their reproductive desires by 2 or more children.

The result is a strong increase in women's and men's desired fertility with a shift in modal desires from 3 to 4 children. Women have increased their desired fertility by 0.74 children from 3.19 to 3.93 children, and men by 0.64 children from 3.42 to 4.06 children on average.

These changes in desires reflect meaningful and often unanticipated changes to individuals' lives rather than noisy and inconsequential, temporary changes. Excess fertility is widespread already in respondents' early thirties. 34% of women have more children than they desired in survey round 2, with another 27% of women having exactly reached their desired number of children (see figure C.1). On average, women are only .13 children away from their desired number of children. If all women were to reach their currently desired number of children, 58% of women would have more children than desired and on average .78 children more than initially desired. For men, these shares would be 52% and .68 children more than initially desired. Excess fertility is not as pronounced for men yet as they marry and start having children later. Still, 24% of them already have more children than initially desired and another 20% have exactly reached their desired fertility.

Reproduction is thus an important domain of life that for many did not turn out as anticipated or desired. Most deviations in desired and actual fertility were unanticipated in one of two ways: either in the form of unexpected and initially undesired additional children, or in the form of unanticipated increases in reproductive desires. Importantly, for most individuals, initial desires presented an upper bound of their desired number as Mueller et al. (2019) show for earlier survey rounds of the KLPS. When asked whether they would prefer to have one child fewer or more than their desired number, 74% of women say "fewer". In addition, most women were able to imagine lowering their desires under certain scenarios, but found it unimaginable they might increase their desires under any scenario.

How aware are respondents of these unanticipated developments? Are they able to remember what they once wanted or is their memory tainted by what happened?

3.4 Memory of Past Reproductive Desires

In this section, I document that the memory of women and men is inaccurate, biased and dependent of how life has turned out for them personally over the past decade. For this purpose, I evaluate respondents' memory in round 4 of how many children they desired at the time of survey round 2 against their actual past desires in round

2.⁶ Using data on their actual number of children in survey round 4, I then examine how their memory depends on their personal experience over the past decade. I characterize personal experiences by comparing respondents' current desires and actual fertility to their past desires in round 2.

Respondents' memory is inaccurate as only 33% (36%) of women (men) remember the exact number of children they desired in round 2. Overestimating one's past desires is twice as common as underestimating them; 45% (41%) of women (men) overestimate, 22% (23%) of them underestimate their past desires. Too many women and men think they wanted 4 or more children already a decade ago when desiring 3 or fewer children was more common than they can remember (figure 3.2b). On average, women remember wanting 3.61 children, which is much closer to their current desires of 3.93 children than their actual past desires of 3.19. How closely are their remembered desires tied to their current desires? To answer this question, I estimate a simple model in which their recalled desires follow a weighted average of their past desires and current desires:

$$x_{i,2|4}^R = \alpha x_{i,4} + \beta x_{i,2} + \epsilon_i \quad (3.1)$$

Women and men put much more weight (.58) on their current desires in round 4 than their actual past desires (.40) as stated in round 2, as can be seen in the estimates presented in table 3.2. Their current situation therefore does seem to present a strong influence on their perception of their past desires. This anchoring is sizable, especially compared to estimates of projection bias (Loewenstein, O'Donoghue and Rabin, 2003) of around .3 to .4 by Conlin, O'Donoghue and Vogelsang (2007), where the projection does not involve prediction of future state-dependent utility, but rather retrospection into one's past state-dependent utility.

Memory is not just inaccurate and too close to current desires, it is also biased. Those with excess fertility are significantly worse at remembering their past desires and overestimate their past desires more than those with fewer children than desired underestimate their past desires (see table C.1). Individuals with excess fertility are 13 percentage points less likely to correctly remember their past desires than

⁶An overview of the design can be found in figure 3.1. Following the wording about their reproductive desires ("Today, if you could choose exactly, how many children do you want to have in total, including any you have now?"), we asked two versions of the recall question to match their past question: 1) "If we had asked you back then, how many children in total would you have said you would like you or your partner to give birth to, including any who had already been born?" 2) When we asked you back then, how many children in total did you say you would like you or your partner to give birth to, including any who had already been born?" In this section, I pool the answers to both questions, but will distinguish different conditions for this recall question in section 3.5 to learn more about the reasons behind inaccurate and biased memory.

those without excess fertility, among whom 39% correctly recall their past desires. The same pattern holds for other measures of recall performance such as the overall “recall error” or its absolute measure (see table C.1).

This systematic upward bias in memory for individuals with excess fertility cannot be explained by a desire for consistency (Falk and Zimmermann, 2013) or by rational belief updating about one’s past desires using one’s number of living children as signal. Women and men consistently overestimate their past desires conditional on their current number of children (as displayed in figure 3.3). While those with more children on average did desire more children in round 2, they did not desire as many as respondents remember. This discrepancy appears to widen with the number of living children. For example, while those with 2 children overestimate their past desires on average by ca. .25 children, those with 5 children do so by .71 children.

These average patterns are driven by too few respondents stating that they remember wanting fewer children than they have today and too many respondents stating they always wanted as many children as they have today or more. Conditional on individuals’ current number of children, the distribution of remembered desires is systematically distorted compared to the distribution of actual past desires for those with 4 or more children (shown in figure C.2). These shifts reveal the systematic bias towards overestimating past desires in more detail and are far from random, noisy inaccuracies.

More generally, the systematic bias in respondents’ memory appears tied to avoid declaring any child as undesired and not just to excess fertility itself. For example, those who have exactly reached their desired number of children (or are one child away) are very unlikely to underestimate their past desires at all (or by more than one child). Despite not having more children than once desired yet, underestimating one’s true past desires by too much would still mean declaring at least one child as undesired. While underestimating one’s past desires by 1, 2 or more children does happen for those 2 or more children away from their past desires, it does not happen to those closer or at their desired family size. This behavior is slightly more subtle, but apparent when plotting individuals’ recall errors ($x_{2|4}^R - x_2$) by excess fertility (as available in figure C.3).

In addition, memory seems to be biased in the opposite direction for those far away from reaching their past desires, especially women. Among those with 3 or 4 children away from their desired family size, almost no respondent overestimates their past desires. Rather, ca. 70% underestimate and 30% correctly remember their past desires. The pattern is the same for men albeit less pronounced. As a consequence, the distribution of memories appears unbiased and symmetric only for those one or two children away from their desires.

The results document that respondents' memory of past reproductive desires is inaccurate, biased and closely related to personal fertility histories. This raises several follow-up questions: is biased memory the result of psychological motivations or due to insufficient effort or some mechanical explanation? In case memory is motivated, are memories forgotten or suppressed? And does biased memory have measurable consequences in this context?

3.5 Mechanisms of Memory

Why is memory asymmetric and biased? In this section, I examine whether biased memory is motivated and whether memories are forgotten or suppressed.

I focus on respondents with excess fertility as a group with potentially increased psychological costs of accurate memory. They might have various concerns. They could worry about perceiving themselves not to be in charge of their life, about life having turned out differently than once desired, or about admitting that a child was unwanted.

The results are consistent with motivated forgetting of past desires for those with excess fertility. I provide two key pieces of evidence on respondents' recall of past reproductive desires and their take-up of the information offer to shed light on the questions above.

Recalling Past Reproductive Desires

Do monetary incentives have the power to make respondents' memory less inaccurate and biased, by inducing effort and/or crowding out certain psychological concerns? The evidence in figure 3.4 shows that recall appears to improve with increased effort, but not for those with potential psychological concerns. First, recall of the past vice-president significantly improves with monetary incentives for those with and without excess fertility. The share correctly recalling the past vice-president increases by 16 percentage points for both groups. In contrast, recall of past fertility desires only improves for those without excess fertility, with accurate recall increasing from 34% to 44% of respondents. It does not improve for those with excess fertility, among whom 24% recall their past desires without monetary incentives and 26% with monetary incentives. The difference in reaction to those without excess fertility by those with excess fertility is specific to the fertility recall as there is no such difference in reaction for the past vice-president question. The p-value of this triple difference-in-difference is .1.

This seems to suggest that those with excess fertility do not get better at recalling their past reproductive desires due to psychological concerns. This could be either because the monetary incentives do not suffice to overcome the psychological concerns, or because these memories are not easily accessible.

Evidence on respondents' effort shows that these memories might not be easily accessible for those with excess fertility. Effort as measured in seconds spent on a question increases equally with monetary incentives for both groups on each of the two questions (see Appendix figure C.5). They spent 7 to 8 seconds more on the past fertility question, up from almost 30 seconds for both groups without monetary incentives, and 11 to 13 seconds more on the past-vice president, up from ca. 18 seconds for both groups. Recall thus improves with monetary incentives and increased effort whenever the potential memory does not come with potential psychological concerns. Since respondents with excess fertility do spend more time thinking about the question, it appears that they have indeed forgotten these memories rather than suppressing them. If respondents were suppressing memories, it seems odd to spend more time thinking about the question. Higher monetary incentives may improve recalled fertility desires even for those with excess fertility, but two additional reasons cast doubt that they would. First, recalled fertility desires are not more accurate when paying KES40 (\$.40) rather than KES20 (\$.20). Second, these are meaningful incentives as KES40 is close to the median hourly earnings in this sample.

Alternatively, could the pattern above be explained by differences in recall ability? Those with excess fertility are also worse at recalling the past vice-president, which means they could generally be worse at remembering. Memory of past fertility desires stays asymmetric when controlling for respondents' income (decile), cognitive score (Raven Test), or level of education at survey round 2. This is true no matter whether controlling for these factors linearly, by including dummies for several categories or splitting the controls into a group above and below median. This makes it unlikely that the differential performance of those with excess fertility across the two types of questions can be explained by any of these factors. This pattern also holds when using alternative measures of recall performance such as recall error, which means that it is not specific to the chosen measure of "correct recall". The worse recall of the past vice-president for those with excess fertility could be a feature of associate memory when forgetting certain aspects about the past (as in Zimmermann (2020) and Enke, Schwerter and Zimmermann (2020)). While this is theoretically possible, I do not have evidence that can explain the reasons behind this asymmetry.

To tease out respondents' desire not to remember certain things irrespective of the ability to recall them, I make use of the additional information offer in the next subsection.

Information Offer about Past Reproductive Desires

At the end of the fertility module of the round 4 survey, those who had participated in survey round 2 were offered to find out how many children they had actually desired 10 years ago. Field officers instructed respondents that they would have the chance to find out their past answer if they reminded the field officer of the offer at the end of the survey. While everyone in this group was offered the information, 40% were also told that they were drawn in a lottery such that they would receive KES20 (\$.2) if they chose to remind the field offer at the end of the survey. Respondents who had not participated in survey round 2 were informed of the same lottery of KES20, but without any information about past desires.

The interview was designed to allow some time to elapse between the offer and the opportunity to remind the field officer of it to give respondents who would like to avoid the information an opportunity to do so. This worked well in wave 1 of survey round 4, with an average of 29 minutes elapsing between the information offer and the opportunity for seizing it. It worked less well in wave 2 when only 18 minutes elapsed on average due to cuts to the survey. Since the elapsed time between the offer and the choice affected take-up, this difference influenced respondents' choices across the two waves. This is why I present results for both waves separately in figure 3.6.

Respondents' take-up of the information offer implies that those with excess fertility avoid the offer more than those without excess fertility, suggesting that they fear some undesirable information. As shown in figure 3.6, while the two groups take up the offer at similar rates when only the information is offered, those without excess fertility react much more to the additional monetary incentives (+20 percentage points) than those with excess fertility (+8percentage points). This implies that the share with perceived costs between KES0 and KES20 of taking up the information is estimated to be 12 percentage points higher among those with excess fertility than among those without. This asymmetry is not there in wave 2 (see panel b)), most likely because the shorter time between the offer and the choice did not leave respondents enough time to forget or refuse the offer (see figure 3.6).

The asymmetry is particularly pronounced for women (in wave 1). 24 percent of women without excess fertility take up the information due to monetary incentives, but only 5 percent among those with excess fertility do so. Table C.5 presents the regression results of the information take-up for waves 1 and 2 jointly as well as separately.

Joint Behavior on the Recall Question and the Information Offer

Respondents' behavior on the recall question and the information offer are correlated. Those who do not remember their past desires are significantly less likely to take up the information offer. This is particularly true for those with excess fertility. Respondents' forgetting and information avoidance may thus be driven by similar concerns about undesirable memories.

Figure C.8 shows that take-up of information without any monetary incentives is 50% among those who correctly recalled their past desires (independent of excess fertility), but only 40% among those who did not recall their past desires. For respondents without excess fertility, monetary incentives close the gap between those recalling (take-up +16 percentage points) and those not recalling their past desires (take-up +26 percentage points). For those with excess fertility, monetary incentives do not close the gap. Monetary incentives increase take-up by those recalling their past desires by 18 percentage points and by 16 percentage points for those not recalling their past desires.

As a result, the asymmetry in take-up based on excess fertility is only present for those who do not recall their past reproductive desires. This suggests that individuals with excess fertility who decided not to take up the information offer had reasons to avoid the information offer and to forget (or not remember) their past desires. These concerns do not seem present for those with excess fertility who did remember their past desires as they access the information equally often as those without excess fertility who recall their past desires. These results imply that there is a subgroup among those with excess fertility who did not remember their past desires and does not want to be reminded of them.

Together, respondents' behavior on the recall question and the information offer represent an interesting state of memory: while some respondents may have forgotten their past desires, they simultaneously appear to have a clue that the information offer might contain some information they do not want to know.

The (Un-)Desirability of the Information Content

Further evidence that people specifically avoid the information content, in particular those suspected to do so, support the interpretation that psychological motivations drive the observed asymmetries in information take-up and recall behavior. Adding the information offer to the promise of KES20 actually reduces take-up by 11 percentage points for respondents with 4 or more children, but not for respondents with fewer children (see figure C.9). Respondents with 4 or more children are much

more likely to have more children than desired, suggesting that it is the potential information about excess fertility they are avoiding.⁷

The more undesired children respondents have, the less likely they are to take up the information offer, suggesting that potential psychological costs are also tied to the intensive margin of excess fertility. This is particularly pronounced for women. While 70% of women who have reached their desired family size demand the information under monetary incentives, these shares fall to ca. 50%, 40% and 30% for those with one, two and three undesired children (results are available in figure C.11).

The results above are consistent with respondents displaying demand for (avoiding) certain memories. They appear averse to admit excess fertility and that any children might not have been desired initially. More generally, respondents may care about ex-post rationalizing when life has turned out differently than once hoped. For example, for those still 3 children away from their past desires, memory strongly depends on their current desires or of how hopeful they are to achieve their past desires. Those who lowered their desired number of children since KLPS-2 on average underestimate their past desires by 1 child, but those who did not lower their desires overestimate their past desires by .25 children. Memory is thus also asymmetric and biased in this sub-group, but exactly in the opposite direction.

These patterns illustrate the richness of potential concerns in the context of fertility. Focusing on excess fertility in this sample does not imply that individuals with excess fertility necessarily have stronger concerns than those without excess fertility. In other samples (or at other times), those who remain childless against their desires might have a stronger need to ex-post rationalize for example. Given the set of potential concerns in this sample, how do those with excess fertility achieve selective memory?

3.6 The Dynamics of Memory

I next explore the dynamics of biased memories using both the recall question and information offer. Similar to findings by Zimmermann (2020) and Huffman, Raymond and Shvets (2019) on selective forgetting over the span of months, I find tentative evidence consistent with selective memory over both longer and shorter horizons of years and minutes. Time seems key to forgetting what you want to forget. This

⁷The assignment of respondents to the “Money (20 KES) + Info” condition was random, but the assignment to “Money (20 KES) Only” was not. It was given to everyone who did not participate in KLPS-2. As long as conditional on the number of children, the two groups do not differ in some way that affects their take-up in either condition, the difference should be due to the additional information offer.

demonstrates both the potential power of time to help forget and its limits as individuals cannot manipulate their memories at will in an instant.

I first focus on correlational evidence of how respondents' recall errors vary over years since the birth of a child (presented in table 3.3). I distinguish between children depending on their birth order position relative to the number of initially desired children. For example, the birth of a child could imply reaching one's desired number of children ($x_2 - 0$), surpassing it by one child ($x_2 + 1$) or still falling short by one child ($x_2 - 1$). There are two interesting aspects to people's overestimation of past desires over time and additional children. First, the overestimation of past desires in the year a child is born increases with each additional child: while respondents on average underestimate past desires by .19 children after having their third-to-last desired child ($x_2 - 2$), they overestimate their past desires by .77, 1.17 and 1.56 children right after the birth of their first, second or third undesired child. Second, for all children, the overestimation increases the older the child gets. For every desired child, the slope with respect to "Years since Birth" is .05, for undesired children it is .08 and higher.

Memories thus appear to adjust upwards over time and one child at a time. At the same time, with each additional undesired child it also seems to become harder to hold memories that all children were desired. Following regressions in table 3.3, average memories would reach the point of remembering every undesired child as desired after 4 years for the first undesired child, after 10 years for the second and 16 years for the third undesired child.

Similar patterns of imperfect selective forgetting one child at a time can also be seen in the distribution of recall errors by excess fertility (figure C.3). This sequential forgetting over time may also explain how respondents with two or three undesired children react to monetary incentives: they may believe that they wanted one child less than they currently have, but seem to have forgotten that they actually wanted two or three children less.

I next provide evidence that time also helps with information avoidance. When coupling the information offer with monetary incentives, this creates a desire to ignore the offer for respondents with excess fertility. Having more minutes to forget the offer appears crucial. Respondents with excess fertility demonstrate a steep decline in information take-up over time elapsing between the offer and the end of the survey (see panel b) of figure 3.7). The difference is also significant when estimating linear slopes of forgetting (available in table C.6). Under the bundled offer of information and money, every 10 minutes reduce take-up by 8 percentage points for those without excess fertility and by 13.4 percentage points for those with excess fertility. This difference is significant at the 10 percent level, indicating a more successful information avoidance among those with excess fertility when given

sufficient time to forget the undesirable offer.⁸

3.7 Implications of Biased Memory

Does memory have any consequences in this context? Biased memory could be related to various aspects in this context: one, it could be associated with respondents' mental health and well-being and also impact respondents' love for and treatment of their children. Two, it might be related to their beliefs of what is optimal and what they would recommend the younger generation to do when it comes to questions of marriage and fertility.

In this section, I provide evidence that individuals' recommendations of how many children to have are strongly correlated to their remembered past desires. Biased memory in form of overestimating one's past desires in turn is associated with women and men recommending 18-year-olds to have more children and to get married earlier than those not overestimating their past desires would recommend.

First, respondents' answers to how many children they would recommend an 18-year-old to have in their life are most closely related to how many children they recall having wanted themselves in their early-to-mid-twenties, and more strongly so than to their current or past desires or their perception of the prevailing local norms (results are available in table C.3). Remembering to have wanted one child more is associated with recommending .18 children more. Whereas respondents' actual past desires are not correlated to their recommendations, the coefficients for their current desires and their perception of local norms are .13 and .1, respectively. Women and men slightly differ in this regard: while women's recommendations are most strongly linked to their memory of past desires and not to their current desires, men's recommendations are most strongly related to their current desires and less with what they remember.

Next, I test in more detail how overestimating past desires may matter for recommendations to the next generation, controlling for fixed effects of individuals' past desires and number of living children (as reported in table 3.4). Both, the extensive margin of overestimating at all and the intensive margin of recall errors are associated with individuals' recommendations. For example, compared to someone with accurate memory, an individual who overestimates past desires by 1 child would on average recommend to have .35 children more ($.15 + .20 \times 1$), or .55 children if overestimating by 2 children ($.15 + .20 \times 2$).

⁸The pattern is not driven by a general tendency of those with excess fertility to more quickly forget about the offer, as the behavior of the two groups for the "Information Only" condition in panel a) shows.

For women, biased memory is also related to recommendations of when to get married. On average, women who overestimate their past desires would recommend to get married 9 months earlier than those not overestimating their past desires. This effect is mostly driven by the intensive margin: the more women overestimate their past desires, the earlier they recommend to get married.

3.8 Conclusion

How does memory shape what people learn from their personal experiences about their preferences and beliefs? This paper shows that in the context of fertility, people view their personal experiences, or number of children, as informative about their past desires. This is true even when life outcomes deviate from past desires. Rather than seeing such deviations as the result of other, external influences on outcomes or intermediate desires, they mis-remember their past desires in the direction of their life outcomes. This selective memory is partly motivated. Respondents do not recall undesirable memories and forego money to avoid being reminded of these memories. However, selective forgetting is not without limits: the more “undesired” children people have, the harder it seems to remember all of them as always desired.

The influence of personal experiences on people’s memories of past desires may cause people to infer too much from their personal experiences about their preferences and beliefs. It may also lead people to underestimate the importance of external influences on their lives as well as how common it is to change one’s desires. A key task left for future research is to document the potential implications of selective memory and the motivations behind it, both in this context and more generally. In this context, selective memory is associated with biased intergenerational advice, but it could also affect people’s mental health or treatment of their children for example.

The findings provide evidence that memory distortions over short time periods and in lab experiments in high-income countries extend to survey evidence on long-term memory of big life decisions in the field and in low-income countries. This is good news for studying long-term selective memory using survey panels, but bad news for papers based on retrospective survey questions that might suffer from selective memory.

3.9 Figures

Figure 3.1: Survey and Experimental Design: Survey Components, Treatment Groups and Question Texts

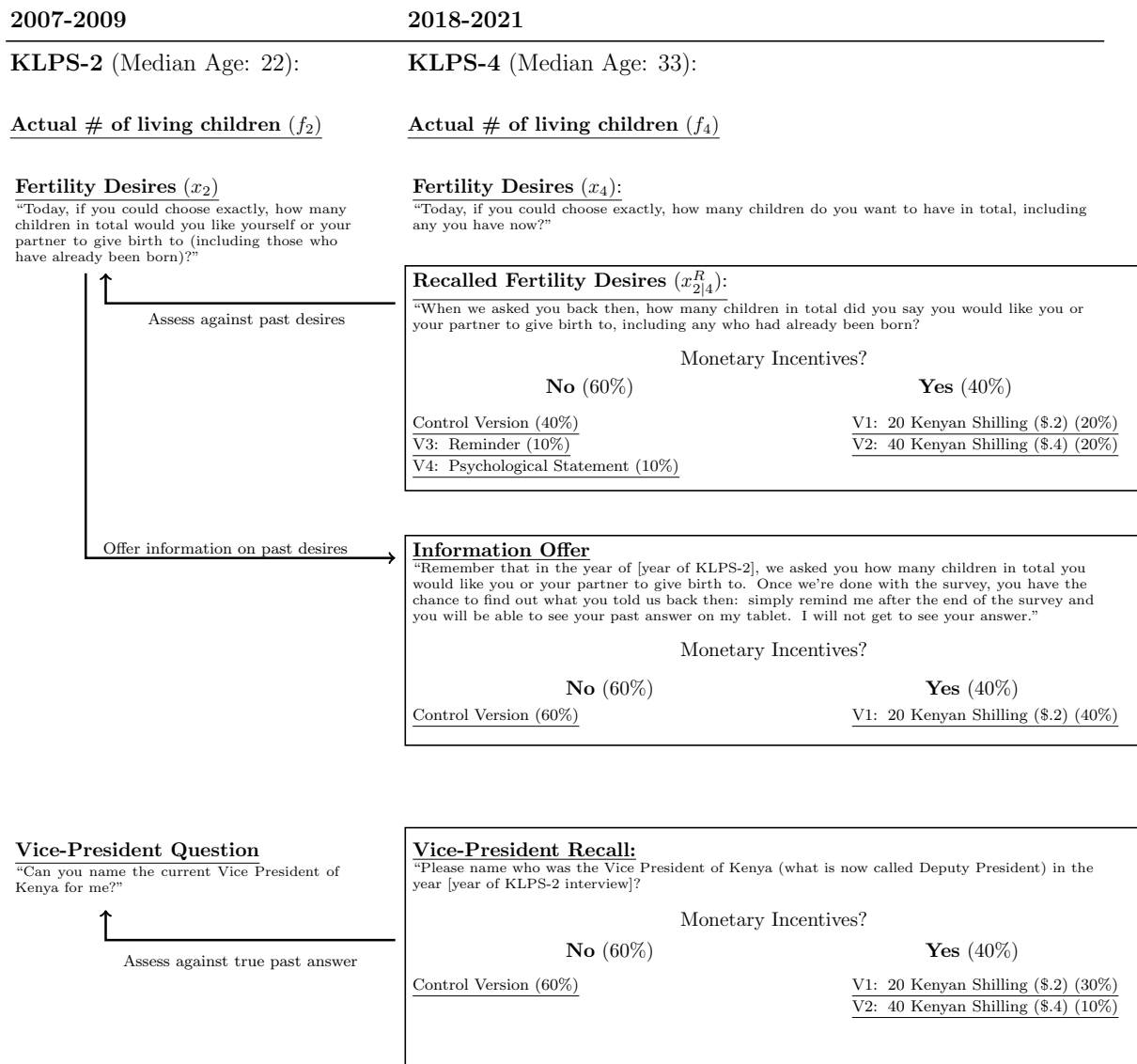
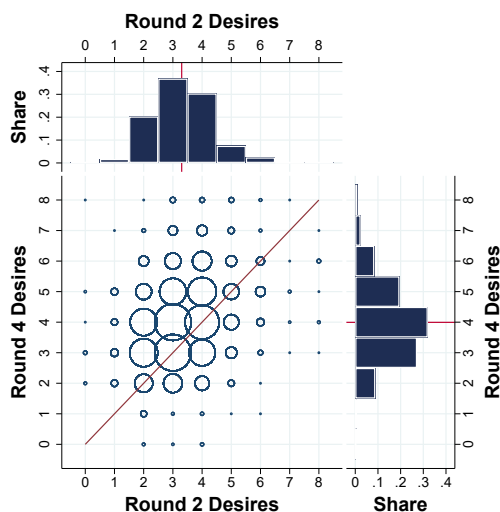


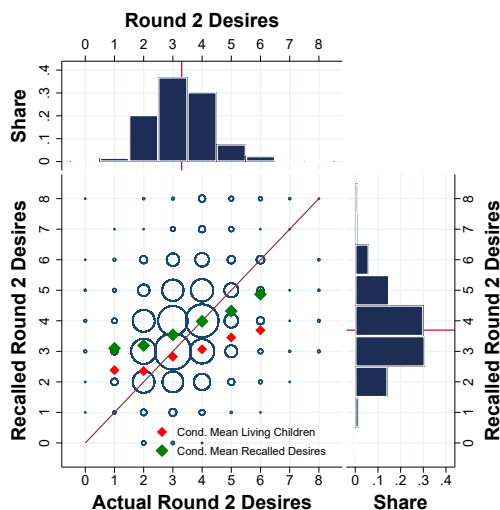
Figure 3.2: Reproductive Desires and Fertility Recall in Round 4 against Reproductive Desires in Round 2

(a) Reproductive Desires in Rounds 2 and 4



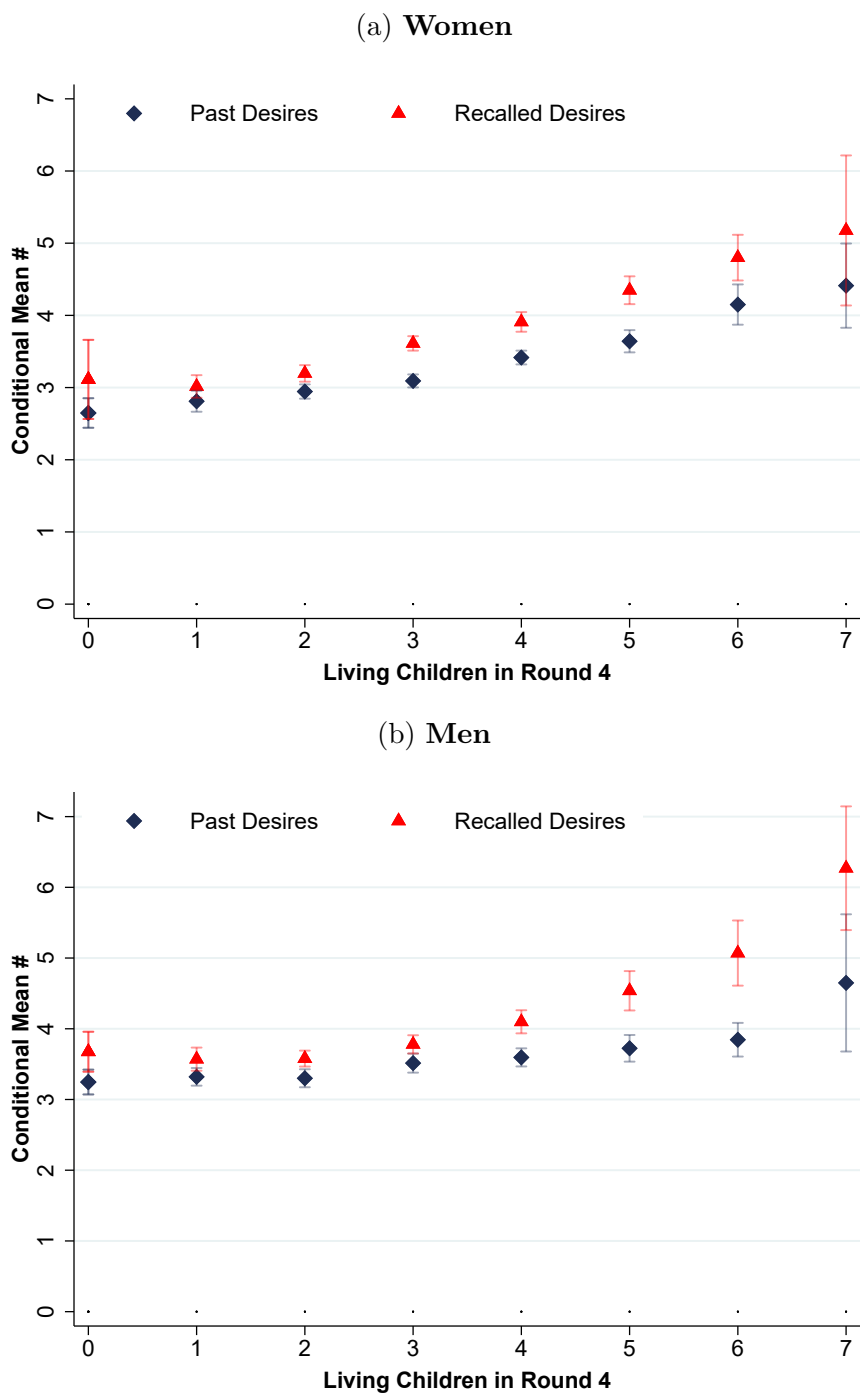
Notes: This figure is based on 3792 respondents with data on reproductive desires between 0 and 8 children in both rounds 2 and 4. The average desired number of children increased from 3.3 to 3.99. The bubbles indicate the number of observations for each combination of reproductive desires in rounds 2 and 4. The bar plots show the distribution of reproductive desires in round 2 (top left) and round 4 (bottom right).

(b) Recall of Round 2 Reproductive Desires (in Round 4) against Round 2 Reproductive Desires



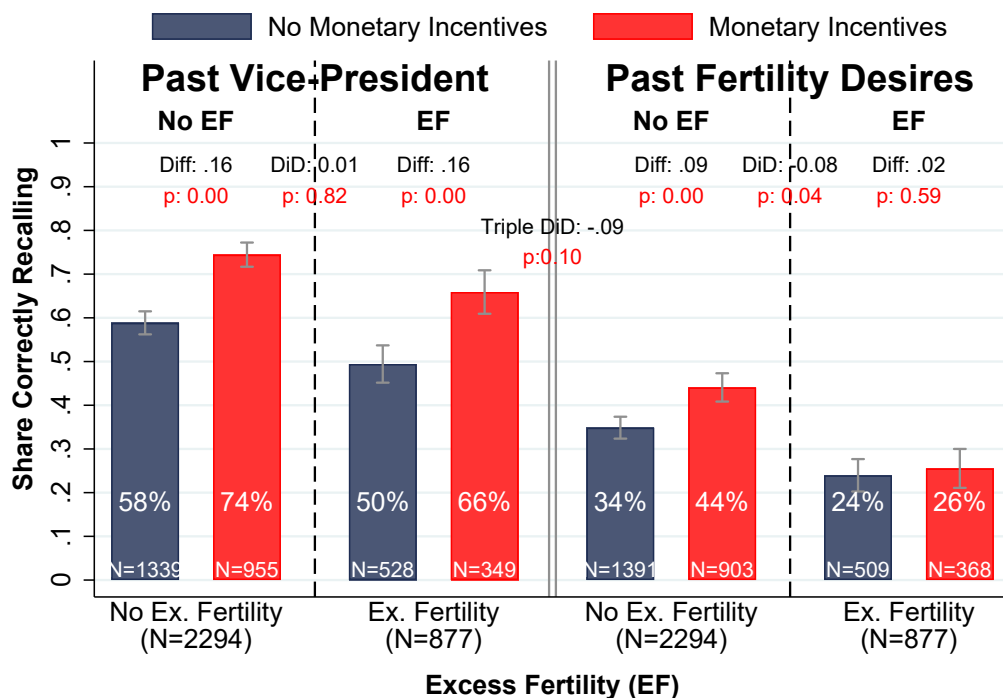
Notes: This figure is based on 3542 respondents with data on reproductive desires between 0 and 8 children in both rounds 2 and 4 and recalled desires between 0 and 8. The average desired number of children in round 2 in this sample was 3.3, the average recalled desires are 3.7 children. The bubbles indicate the number of observations for each combination of reproductive desires in rounds 2 and recalled desires for round 2 (as elicited in round 4). The bar plots indicate the distribution of reproductive desires in round 2 (top left) and of recalled desires for round 2 as elicited in round 4 (bottom right).

Figure 3.3: Conditional Mean of Past Reproductive Desires and Recalled Reproductive Desires by Number of Living Children in Survey Round 4



Notes: This figure shows the conditional mean and the 95%-confidence interval for the past desires and recalled desires conditional on the number of living children at survey round 4.

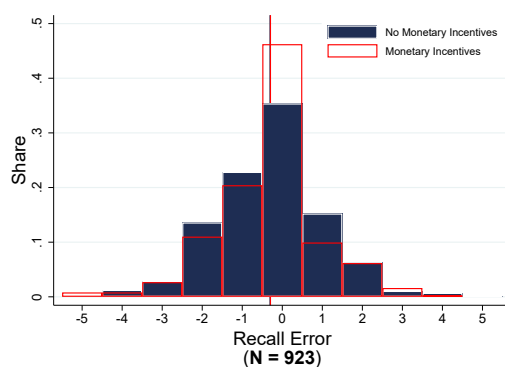
Figure 3.4: Recall Performance and Monetary Incentives: Past Vice-President and Past Fertility Desires



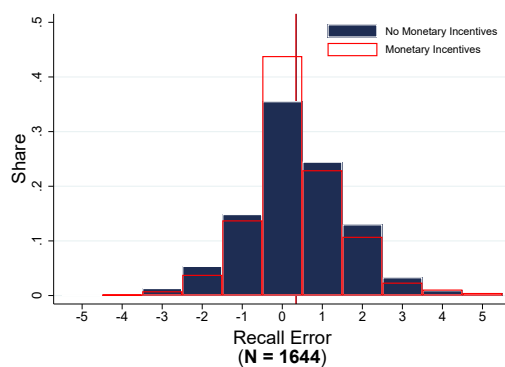
Notes: This graph shows the share (and 95%-CI) of respondents correctly recalling the past vice-president and their past fertility desires conditional on being offered monetary incentives (in red) or not (in blue) and separately for those with and without excess fertility. The difference between these two groups is reported after “Diff:”, with p-values of these pairwise comparisons below in red. The difference-in-difference for each of the two memory questions is reported after “DiD:” and p-values are reported below in red. The unconditional triple difference-in-difference is -.09 (p-value of .1) and reported in table C.2. The sample comprises all those who participated in round 2, knew the name of the vice-president in round 2 and gave an answer to both questions in this survey round.

Figure 3.5: Monetary Incentives vs. No Monetary Incentives: Recall Errors by Excess Fertility ($EF = f_4 - x_2$)

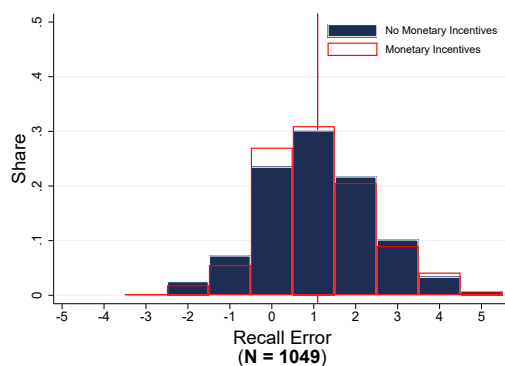
(a) **2 or more children fewer than initially desired** ($EF \leq -2$)



(b) **As many as or one child less than initially desired** ($-1 \leq EF \leq 0$)



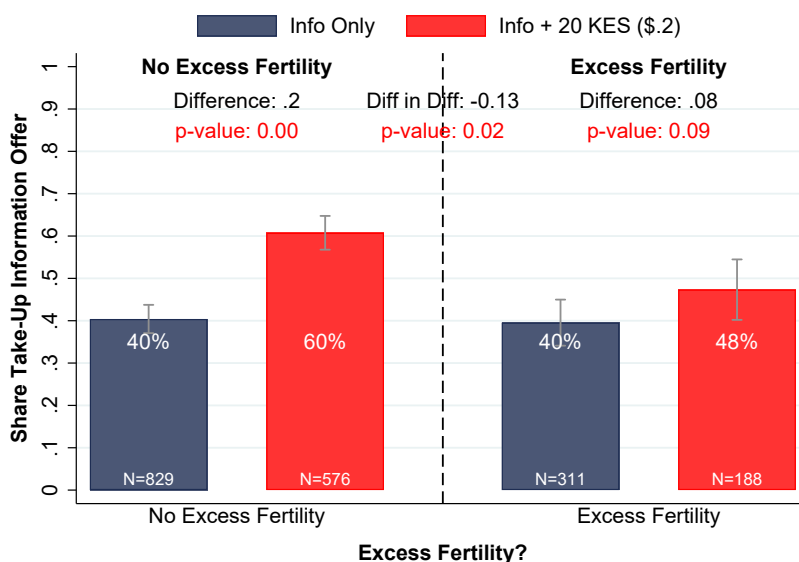
(c) **More children than initially desired** ($EF > 0$)



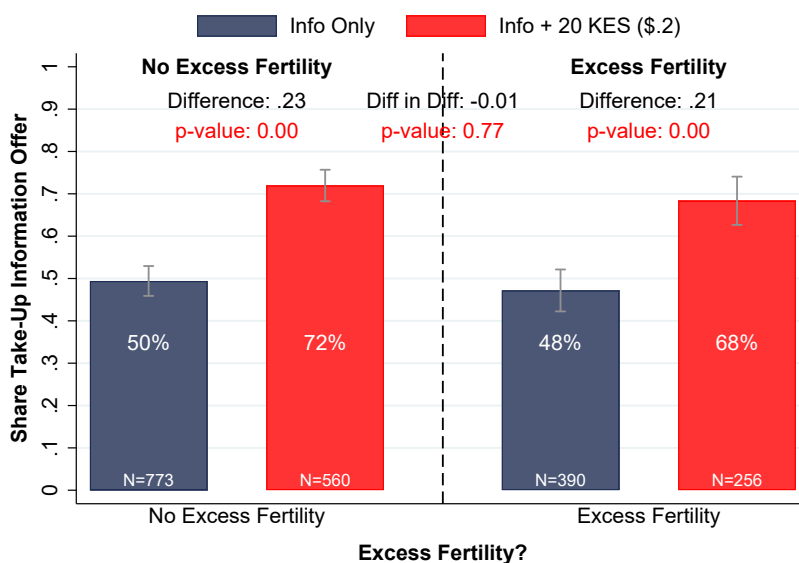
Notes: These graphs show the distribution of recall errors conditional on the extent of excess fertility, separately for those who did or did not receive monetary incentives to correctly recall their past desires. The lines indicate the average recall error for these two groups. The distribution of recall errors is shown for three groups of excess fertility, for those with a) 2 or more children fewer than initially desired ($EF < -1$), b) as many as or one child less than initially desired ($EF = -1$ or $EF = 0$) and c) more children than initially desired ($EF > 0$). More detailed distributions for each level of excess fertility can be found in figure C.4.

Figure 3.6: Information Take-Up by Excess Fertility & Experimental Condition

(a) Wave 1 (Long Gap between offer and take-up: \varnothing 29 Minutes)

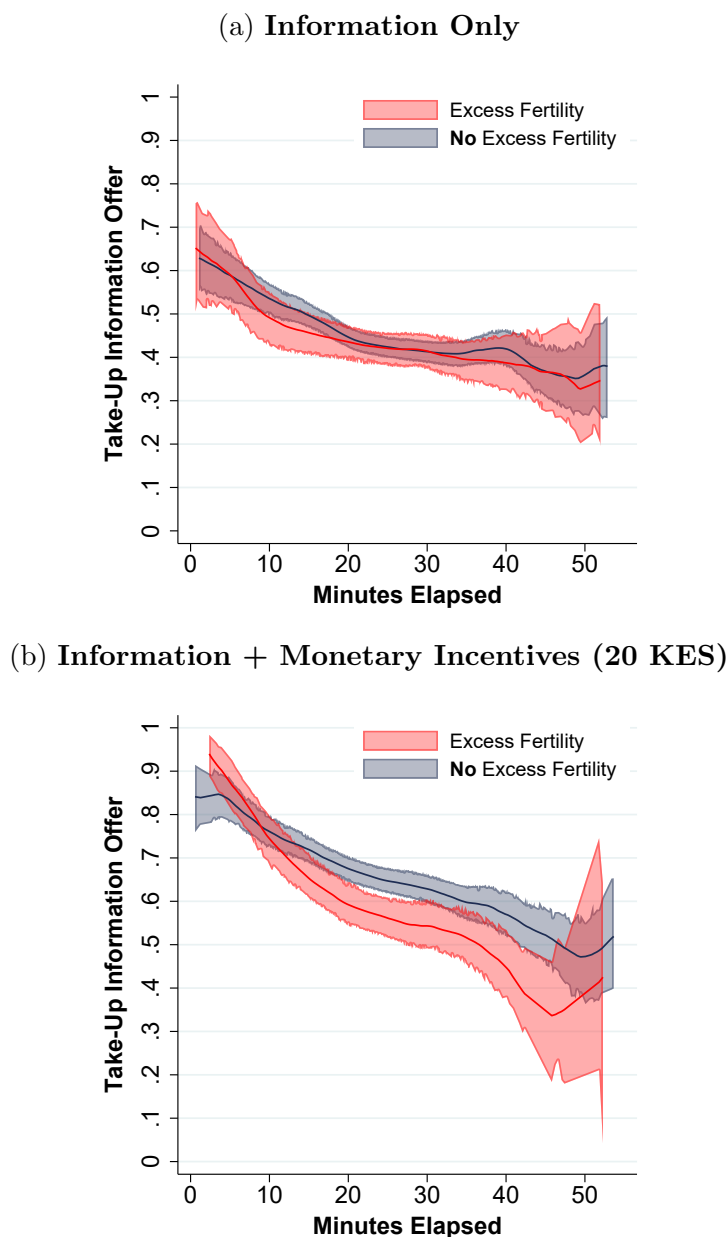


(b) Wave 2 (Short Gap between offer and take-up: \varnothing 18 Minutes)



Notes: These graphs report the share (and 95%-CI) of respondents taking up the information offer depending on the experimental condition and whether they have more children than desired in the past or not. Data is presented separately for waves 1 and 2, because some unrelated survey components between the information offer and the end of the survey were cut. This resulted in less time between the offer and the potential take-up, which is why take-up rates differ so much across these two survey waves.

Figure 3.7: Information Take-Up depending on the Time Elapsed between the Information Offer and the Chance to Remind the Field Officer at the End of the Survey: Locally smoothed Mean by Excess Fertility



Notes: These graphs show the locally smoothed mean share (95%-CI) of respondents taking up the information offer depending on the time elapsed between the information offer and the chance to ask at the end of the survey, both for those with excess fertility (in red) and those without excess fertility (in blue). Panel a) is for those offered the information only and panel b) for those offered monetary incentives (KES 20, \$.2) in addition. The chosen bandwidth is 5 minutes.

3.10 Tables

Table 3.1: Summary Statistics for Respondents with Data on Reproductive Desires in Survey Rounds 2 and 4

	All	Women	Men
Age	33.55	33.27	33.83
Number of Children (Alive) [Rd 4]	2.94	3.06	2.81
Number of Children (Alive) [Rd 2]	.86	1.14	.58
Desired Number of Children [Rd 4]	4.11	3.96	4.26
Desired Number of Children [Rd 2]	3.34	3.19	3.48
Years of Education [Rd 2]	8.9	8.53	9.27
Total Annual Household Earnings (2017 US-\$)	1195.31	839.66	1563.37
” - Median (2017 US-\$)	476.71	353.8	680.57
Total Hourly Earnings (2017 US-\$)	1.16	.72	1.47
” - Median (2017 US-\$)	.57	.31	.81
Observations	3928	1966	1962

Notes: The table shows summary statistics (means) for all women and men with data on their reproductive desires in both rounds 2 and 4. For the number of desired children, only women and men wanting 20 or fewer are included.

Table 3.2: Regressions of Recalled Desires on Current Desires (Rd 4) and Past Desires (Rd 2)

	Dependent Variable: Recalled Desires					
	All (1)	Women (2)	Men (3)	All (4)	Women (5)	Men (6)
Desires Round 4 (α)	.58*** (.01)	.59*** (.02)	.57*** (.02)	.57*** (.01)	.58*** (.02)	.56*** (.02)
Past Desires Round 2 (β)	.4*** (.02)	.38*** (.02)	.41*** (.02)	.43*** (.01)	.42*** (.02)	.44*** (.02)
Test $\alpha + \beta = 1$	0	0	.05			
Constraint $\alpha + \beta = 1?$				✓	✓	✓
N	3604	1798	1806	3604	1798	1806

Notes: Each column reports the result of a separate regression of respondents' recalled desires on their current desires in round 4 and their past desires in round 2 (no constant): $x_{i,2|4}^R = \alpha x_{i,4} + \beta x_{i,2} + \epsilon_i$. Standard errors are reported below the coefficients in parentheses. Columns (4), (5) and (6) report the results of a constrained regression with the constraint of both coefficients α and β summing up to 1. The sample is restricted to those with past, current and recalled desires of 10 or below.

Table 3.4: Regressions for Respondents' Intergenerational Advice of **how many children to have** on Overestimating One's Past Desires, Recall Error and Interaction of these two

	DV: Recommended # of Children to 18-year-old									
	All			Women			Men			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Overestimate Past Desires	.56*** (.04)		.15** (.06)	.54*** (.06)		.24** (.1)	.56*** (.06)		.08 (.08)	
Recall Error		.24*** (.02)	.21*** (.03)		.22*** (.02)	.2*** (.05)		.24*** (.02)	.22*** (.05)	
Overestimate X Error			-.01 (.05)			-.06 (.07)			.01 (.06)	
FE Past Desires		✓			✓			✓		
FE Living Children		✓			✓			✓		
Unconditional Mean		3.14			3.06			3.22		
N	3638	3638	3638	1811	1811	1811	1827	1827	1827	
R ²	.08	.1	.1	.07	.08	.08	.11	.14	.14	

Notes: Each column presents coefficients and standard errors (in brackets) for a separate regression of respondents' recommended number of children to 18-year-old girls (for women) and boys (for men). Significance levels are indicated by *** : .01, ** : .05, * : .1. Observations are limited to those answering 10 or less to the dependent variable, their past desires and number of living children, as well as to those with recall errors between -10 and 10.

Table 3.3: Regressions for Recall Dynamics: Recall Errors (& additional children) by age of child depending on birth order relative to # of desired children in round 2

Dependent Variable	DV: Recall Error ($x_{2 4}^R - x_2$)				DV: Additional Children Born							
	Position Child to Past Desires (x_2):				Position Child to Past Desires (x_2):							
	$x_2 - 2$	$x_2 - 1$	$x_2 - 0$	$x_2 + 1$	$x_2 + 2$	$x_2 + 3$	$x_2 - 2$	$x_2 - 1$	$x_2 - 0$	$x_2 + 1$	$x_2 + 2$	$x_2 + 3$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Indicator Year of Birth	-.19* (.1)	.12 (.08)	.51*** (.07)	.77*** (.08)	1.17*** (.11)	1.56*** (.22)						
Years since Birth	.05*** (.01)	.05*** (.01)	.05*** (.01)	.08*** (.02)	.08*** (.03)	.09 (.06)	.17*** (0)	.15*** (0)	.13*** (0)	.13*** (.01)	.13*** (.01)	.13*** (.02)
N	1201	1717	1499	995	434	155	1201	1717	1499	995	434	155
R ²	.01	.01	.02	.03	.02	.02	.67	.62	.55	.5	.45	.34

Notes: Each column shows a separate regression of the outcome variable on the years since birth of the respective child, and on a dummy indicating the year 0 since its birth for columns (1) to (6). The outcome variable for columns (1) to (6) is the recall error ($x_{2|4}^R - x_2$), for columns (7) to (12) the additional number of children born. The “Position Child to Past Desires (x_2)” indicates how far respondents are from reaching their past desires (x_2) by the birth of the respective child. Observations in each column are restricted to respondents whose child of this “position” are 10 years or younger. Column (2) can be read in the following way, for example: how does recall error vary for respondents over the years since having a baby that leaves them only one child away from reaching their past desires of round 2? Respondents in this group whose baby was just born overestimate their past desires on average by .12. This overestimation increases by .05 children on average with each additional year.

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Appendix A

Appendix Tables & Figures Chapter 1

Table A.1: Histories of Fertility Desires: Share of Observations with specific Desires Rd 2 against Evolution from Rd 1 to 3

Desires Rd 1 to Rd 3	Desires in Round 2								Overall Share	
	0	1	2	3	4	5	6	7		8
0 to 2			.38							.38
1 to 2		.57								.57
2 to 0				.19						.19
2 to 1			1.71							1.71
2 to 2		.19	4.38	.76	.38					5.71
2 to 3			1.71	3.24	1.14	.19				6.29
2 to 4			.19	4.00	1.14					5.33
2 to 5				.38						.38
3 to 0			.38							.38
3 to 1				.38						.38
3 to 2			3.43	2.10	.95					6.48
3 to 3		.38	3.05	8.38	2.48					14.29
3 to 4		.95	.38	2.29	2.29	.76				6.67
3 to 5				.57	1.52					2.10
3 to 6				.19	.57	.38				1.14
4 to 0					.19					.19
4 to 2		.57	2.67	2.10	.95					6.29
4 to 3		.19	2.10	4.57	2.48					9.33
4 to 4			2.86	3.81	6.29	.95				13.90
4 to 5	.76			1.14	3.05		.19			5.14
4 to 6				.38	.57	.57				1.52
4 to 8						.19				.19
5 to 0						.38				.38
5 to 1				.38						.38
5 to 2				.38	.38					.76
5 to 3				.57		.76				1.33
5 to 4			.57		.76	.76	.38			2.48
5 to 5			.57		.57	1.33	.19			2.67
5 to 6							.95			.95
6 to 2		.38								.38
6 to 3				.19			.57			.76
6 to 4					.19					.19
6 to 5					.19					.19
6 to 6					.38					.38
7 to 5				.38						.38
8 to 5				.19						.19

Notes: This table portrays the share of women in the analysis sample who have a specific history of reproductive desires. It is based on those 235 in the analysis sample who participated in all three survey rounds and gave a numeric answer between 0 and 8 children in each survey round. Observations are weighted using survey weights from Round 3, adjusted for the two-stage KLPS tracking design. When classifying histories into 5 types of histories of stable, vacillating, decreasing, increasing and other profiles, the distribution of profiles is as follows: 20.38% have a stable, 16.57% a vacillating, 26.29% a decreasing and 24.76% an increasing profile. This leaves only 12.00% unclassified (other). The profiles are defined as follows: stable ($x_1 = x_2 = x_3$), vacillating ($x_1 = x_3 \neq x_2$), decreasing ($x_3 < x_1$ and $x_3 \leq x_2 \leq x_1$), increasing ($x_3 > x_1$ and $x_3 \geq x_2 \geq x_1$).

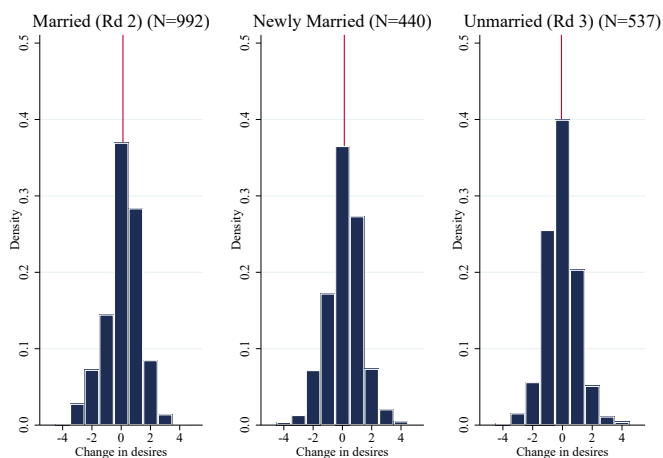
Table A.2: Share of women having a child over a time horizon of 2 or 5 years, conditional on expectations to have a child or not within these time horizons

Time Horizon	Expecting not to have a child	Expecting to have a child
2 years	30%	59%
5 years	60%	79%

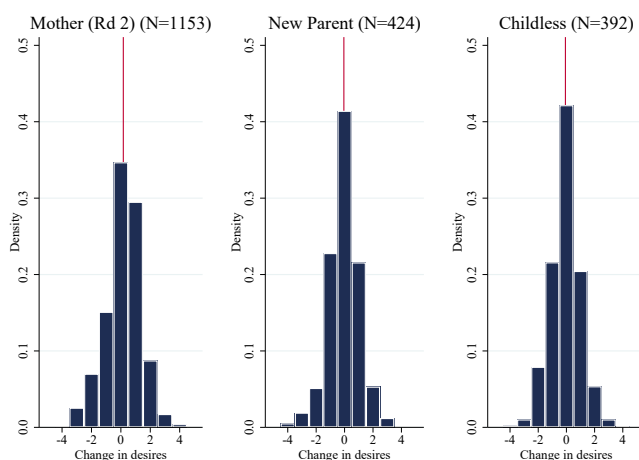
Notes: These shares are based on the 239 women in the analysis sample who were interviewed in all three KLPS rounds, using tracking-adjusted observation weights. 26% expect to have a child in the next two years, 72% do not expect to have one, the remaining women answer either “it depends” or “don’t know”. In the next 5 years, 69% of respondents do expect to have a(nother) child, whereas only 28% do not expect one, and 3% state “it depends” or “don’t know”. Overall, the “inconsistency ratio” is 32.9% over 2 years and 32.4% over 5 years. The odds ratio for these two groups of having a child is 3.36 over 2 years and 2.51 over 5 years, comparable to odds ratio in other samples in this literature (see Cleland, Machiyama and Casterline (2020)).

Figure A.1: Changes in desired fertility by marital status and parenthood

(a) Changes in Desires Round 2 to 3 by Marital Status



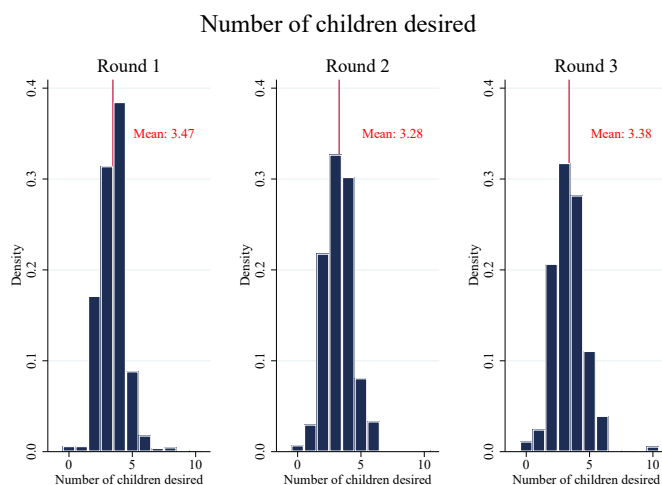
(b) Changes in Desires Round 2 to 3 by Parenthood



Notes: This figure plots changes in fertility desires ($x_3 - x_2$) for women in the extended sample, separately by marital status and parenthood. From left to right, it distinguishes those who had been married (parents) by Round 2, those who married (became parents) between Rounds 2 and 3, and those who were unmarried (childless) by Round 3. Observations are weighted using Round 3 weights, appropriately adjusted for the two-stage KLPS tracking design. Among "Unmarried (Rd. 3)", 26.8% increased desires, compared to 37.1% among "Newly Married" (p-value of 0.001). The average change in desires is -0.08 vs. +0.13 (significant at 1% level). Comparisons of "Unmarried (Rd 3)" vs. "Married (Rd 2)" are similar. There are no significant differences between "Married (Rd 2)" and "Newly Married". For Panel B, the difference is between mothers at Round 2 and the two other groups; recent mothers are significantly less likely (28.1%) to have increased desires than more experienced mothers ("Round 2") with 40.6% (p-value of 0.001). The average change in desires is -0.05 vs. +0.17 (significant at 1% level).

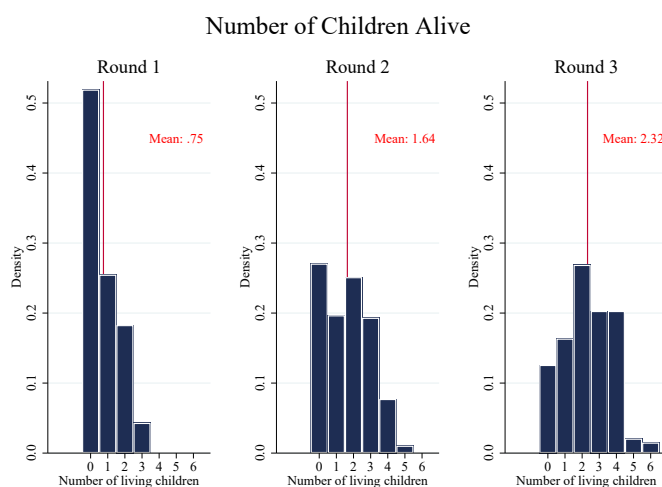
Figure A.2: Distribution of key variables

(a) Distribution of number of children desired across survey rounds



Notes: This figure shows the distribution of desired fertility for the 239 women of the analysis sample who were interviewed for all 3 rounds. Observations are weighted by the respective survey round weights adjusted for the two-stage KLPS tracking design. Respondents who answered “don’t know” are excluded. Those who answered “as many as possible” are re-coded as wanting 10 children. Vertical lines show the average desires of 3.47 in Round 1, 3.28 in Round 2 and 3.38 in Round 3.

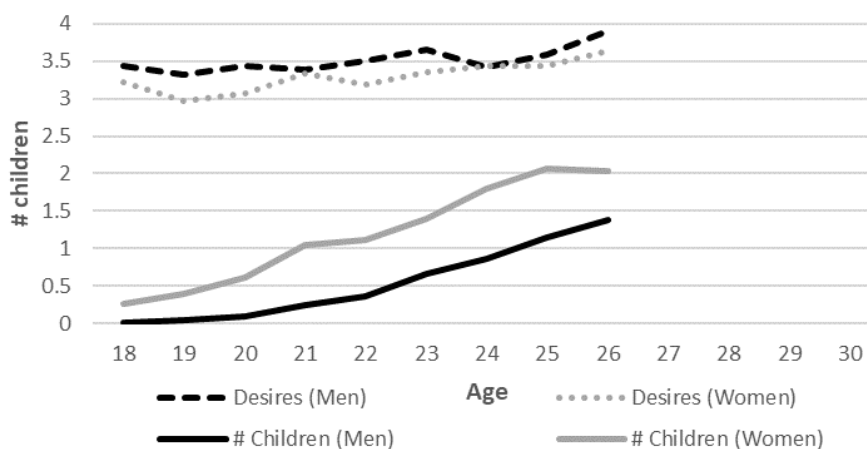
(b) Distribution of actual number of children across survey rounds



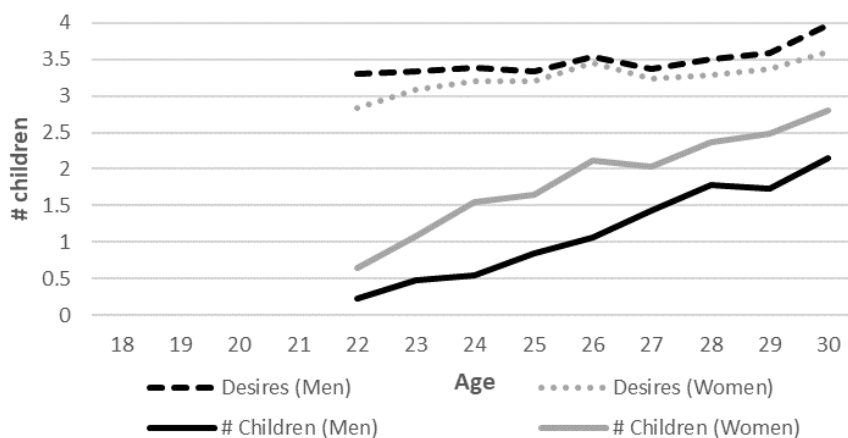
Notes: This figure shows the distribution of actual fertility for the 239 women of the analysis sample who were interviewed for all three survey rounds. Observations are weighted by the respective survey round weights adjusted for the two-stage KLPS tracking design. Vertical lines show the average number of living children of .75 in Round 1, 1.64 in Round 2 and 2.32 in Round 3.

Figure A.3: Evolution of desired and actual fertility across ages

(a) Round 2 Data

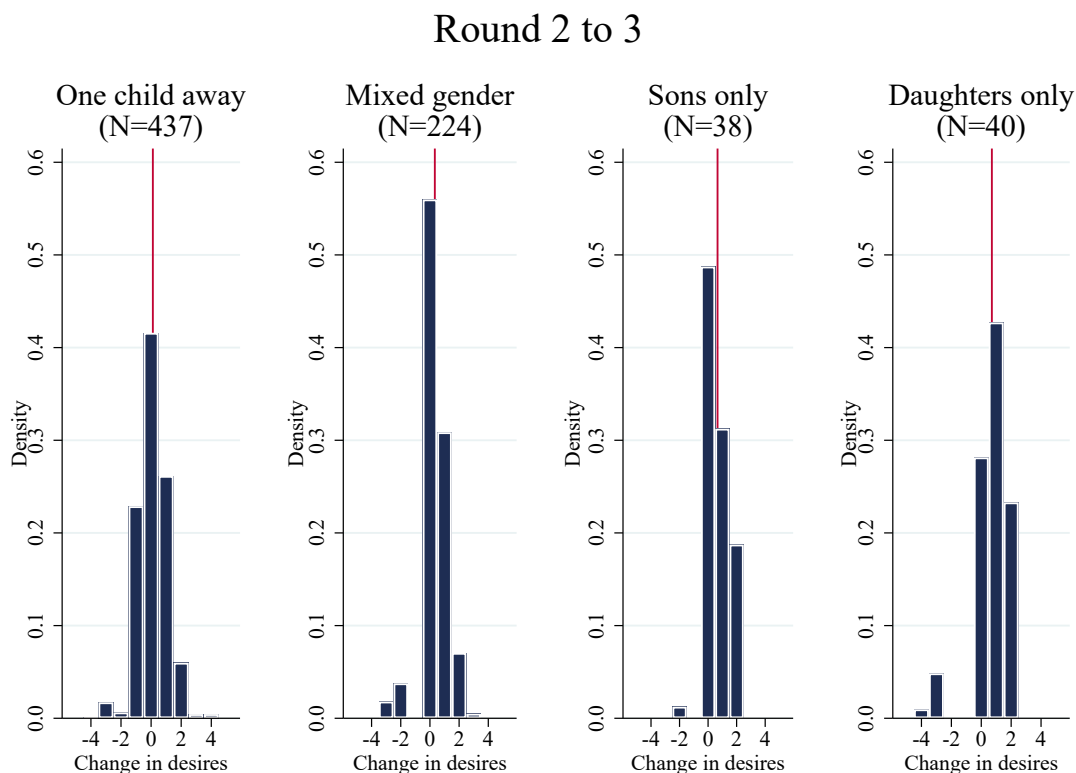


(b) Round 3 Data



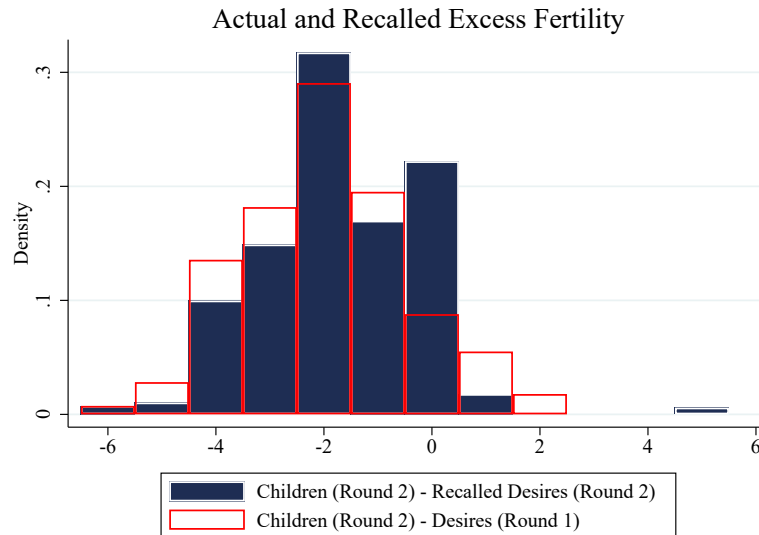
Notes: The figure plots average desired and actual fertility by age for the extended sample respondents, separately by gender and KLPS survey round. Both panels display weighted averages of desired children and number of living children conditional on age, where the survey weights are adjusted for the two-stage KLPS tracking design. Only ages for which there are at least 100 respondent observations are included, resulting in ages 18 to 26 for Round 2 and 22 to 30 for Round 3. Individuals answering “don’t know” or “as many as possible” are excluded.

Figure A.4: Changes in desired fertility: gender realizations (mothers who achieved their Round 2 desired fertility, but do not yet have more children than they earlier desired)



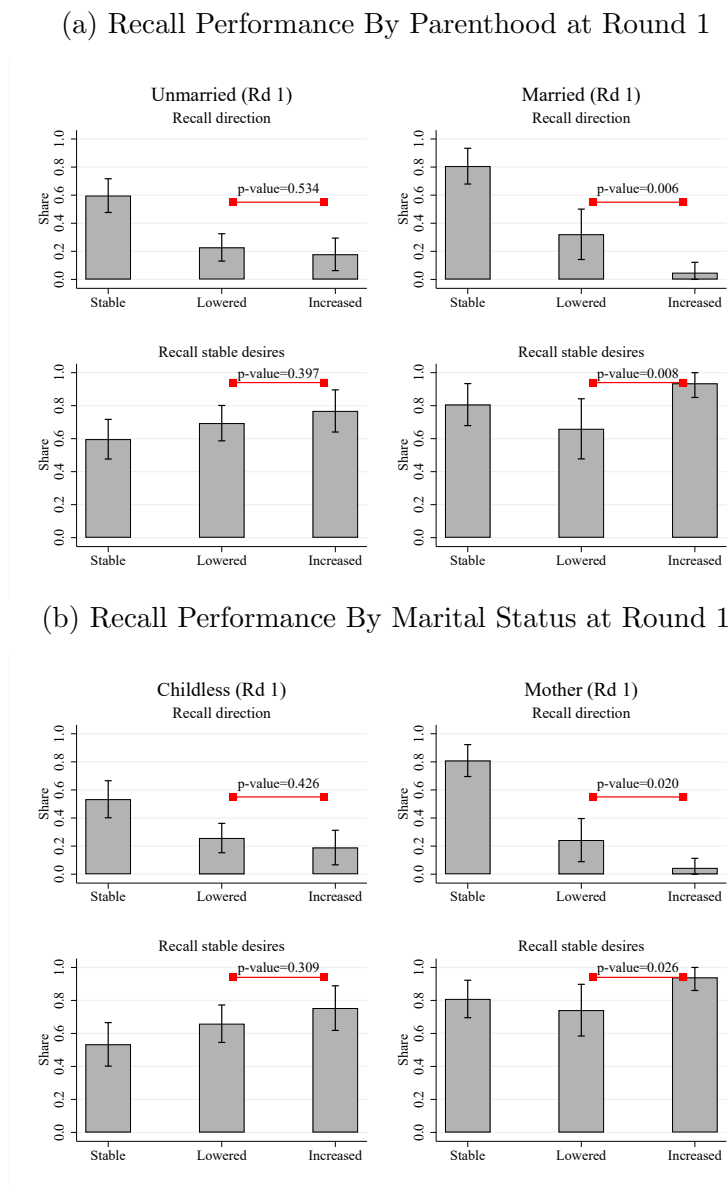
Notes: This graph depicts the change in fertility desires ($x_3 - x_2$) for women who have not exceeded the number of children they desired in Round 2 yet, who have at least two children and who did not experienced a dead birth or the death of a child between the survey Rounds 2 and 3. Observations are weighted by Round 3 survey weights, appropriately adjusted for the two-stage KLPS tracking design. The left panel shows changes for the 437 women who by KLPS Round 3 are one child away from their desired fertility ($f_3 = x_2 - 1$), call this “group 1”. The 3 panels to the right of this graph show changes for women who have reached their Round 2 desired fertility by Round 3 ($f_3 = x_2$), separately for those whose desired children were of both genders (N=224, “group 2”), only boys (N=38, “group 3”) or only girls (N=40, “group 4”). Average changes in desires [and shares increasing desires] (from left to right) were 0.12 [33%], 0.34 [39%], 0.64 [50%] and 0.72 [67%]. Following differences are statistically significant: the share increasing for groups 1 and 2 against group 4 (at the 1% level); the average change for group 1 vs. all other groups (1% level), group 2 vs. 3 (10% level) and group 4 (5% level).

Figure A.5: Measured and perceived excess fertility by Round 2



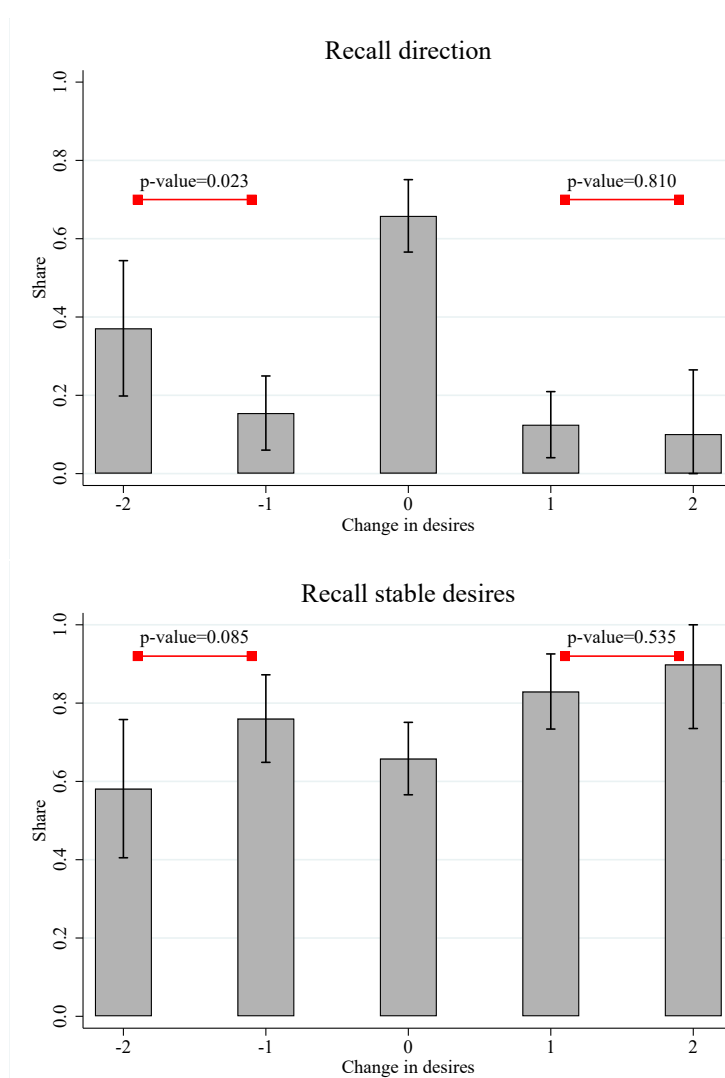
Notes: This figure plots the distribution of excess fertility by Round 2 as judged against true desires in round 1 (i.e. $f_2 - x_1$) [unfilled bars] as well as excess fertility as judged against recalled desires (i.e. $f_2 - \hat{x}_{1|2}^R$) [filled bars]. 273 of the the analysis sample women who participated in Rounds 1 and 2 and gave numeric answers in all rounds are included. The share of those with excess fertility is 7.30% as judged against true past desires and 2.38% as judged against recalled desires. It is 1.34% if judged against current desires (x_2). Observations are weighted using survey weights from Round 2, appropriately adjusted for the two-stage KLPS tracking design.

Figure A.6: Recall performance by parenthood and marital status at Round 1



Notes: For all women of the analysis sample interviewed in both KLPS Round 1 and 2 and with data on recalled desires, these graphs plot the shares (and 95% confidence interval) for correctly recalling the direction of change and recalling zero change, separately by whether they were mothers (panel a) or married (panel b)) by Round 1 or not. Observation weights from Round 2 are used, appropriately adjusted for the two-stage tracking design of the KLPS. There is no significant difference for either recall measure for those who lowered desires depending on whether they were married or not, or mothers or not at round 1. P-values for comparisons for those who increased desires are the following: by marital status (0.111 for recall direction, 0.067 for recalling zero change) and by motherhood (0.063 for recall direction, 0.031 for recalling zero change). Repeating the same for those with stable desires, the p-values are 0.004 in panel a) and 0.030 for panel b).

Figure A.7: Recall performance conditional on the magnitude of changes in desired fertility

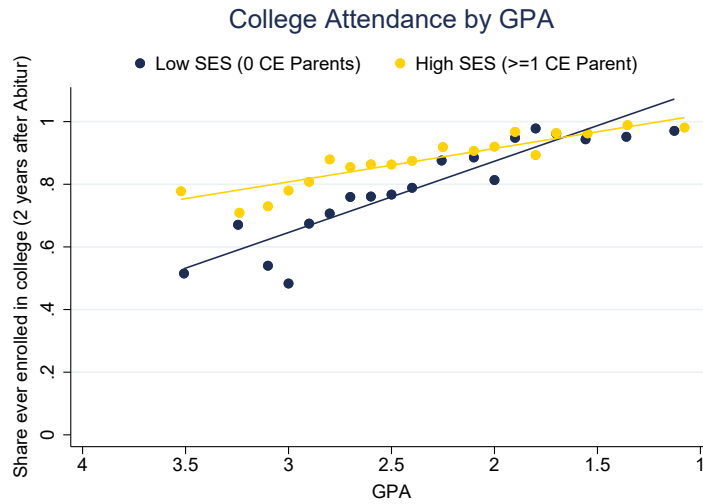


Notes: This table plots recall performance and behavior depending on how much women changed their desires between survey Rounds 1 and 2 (i.e. $x_2 - x_1$), for all women who changed their desires by at most 2 children. This applies to 259 out of the the analysis sample women who participated in both Rounds 1 and 2. Observation weights from Round 2 are used, appropriately adjusted for the two-stage KLPS tracking design. Panel a) reports the share (and 95% confidence interval) of women correctly recalling the direction of the change in desires, panel b) plots the share (and 95% confidence interval) of women who recall having had stable desires. The reported p-values are from testing for equivalence of proportions between those who lowered (increased) desires by two vs. one child. Comparing proportions of those who lowered vs. those who increased desires, conditional on having changed by 2 children (1 child), yields following p-values: 0.073 (0.646) for recall direction, 0.041 (0.358) for recalling zero change.

Appendix B

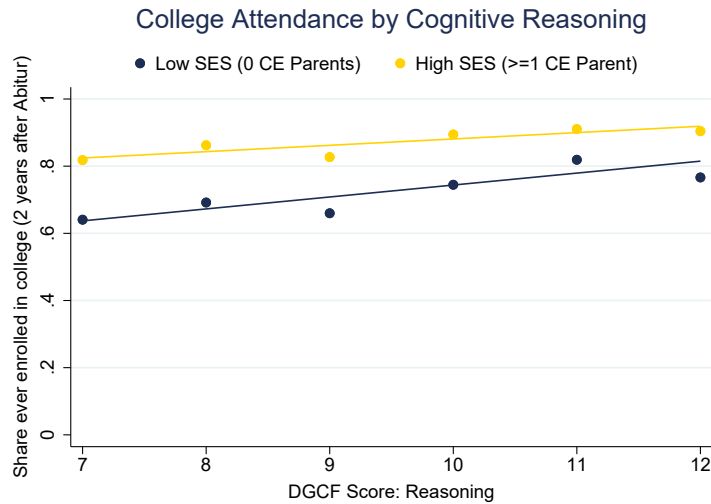
Appendix Tables & Figures Chapter 2

Figure B.1: Socio-Economic Gap by Grade Average



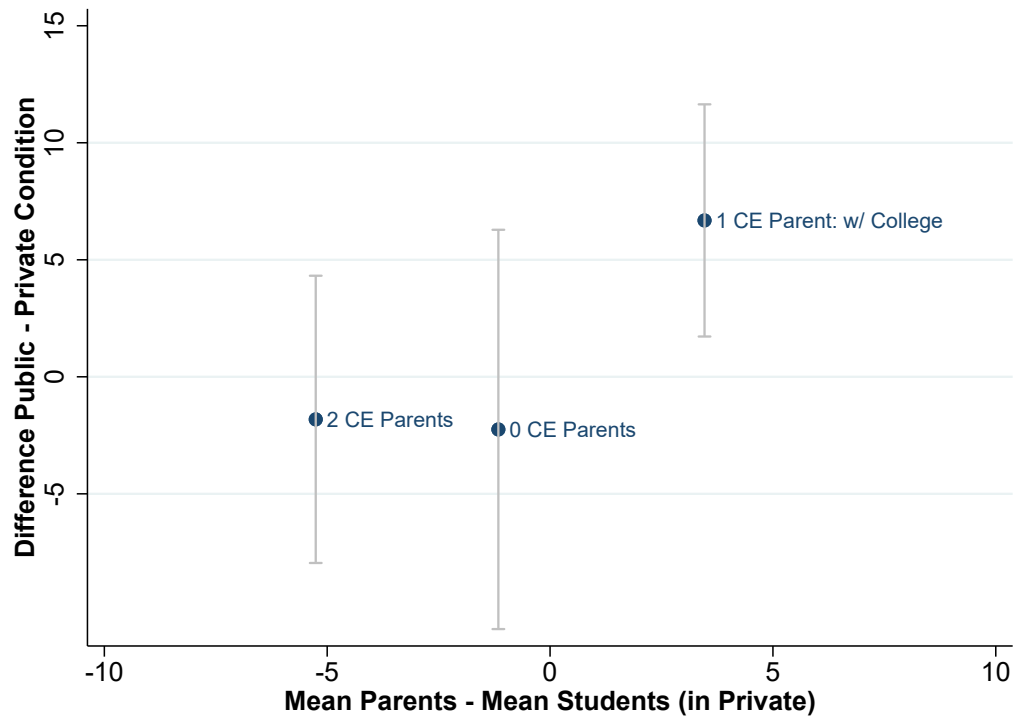
Notes: This figure presents the share of students in the German National Educational Panel Study (NEPS) ever having attended college by ca. 2.5 years after high school (by wave 10) conditional on the GPA for their *Abitur* (their university entry qualification) in a bin-scatter-plot. The shares are presented separately for students without any college-educated parent in blue (termed “low SES (0 CE Parents)”) and students with at least one college-educated parent in yellow (termed “high SES (≥ 1 CE Parents)”). The data is based on 2,714 students with available GPAs. Note that in Germany, the lower the GPA the better.

Figure B.2: Socio-Economic Gap by Cognitive Scores



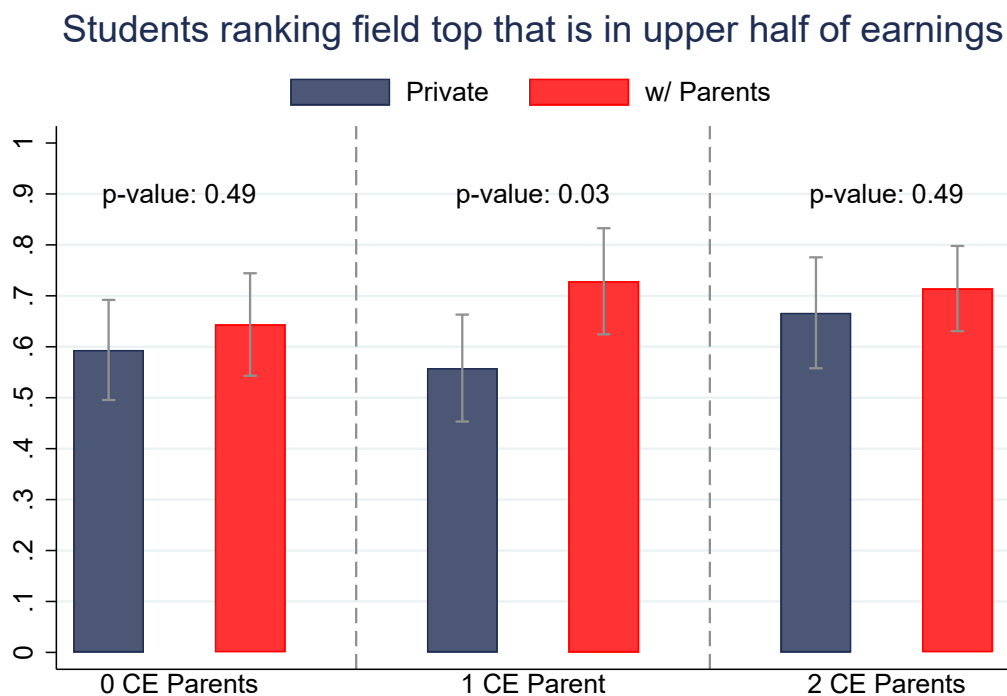
Notes: This figure presents the share of students in the German National Educational Panel Study (NEPS) ever having attended college by ca. 2.5 years after high school (by wave 10) conditional on their performance on a cognitive test during high school in a bin-scatter-plot. The shares are presented separately for students without any college-educated parent in blue (termed “low SES (0 CE Parents)”) and students with at least one college-educated parent in yellow (termed “high SES (≥ 1 CE Parents)”). The data is based on 2,717 students with cognitive scores available. The higher the score, the better.

Figure B.3: Visibility Experiment: Continuous Preference for College vs. VocEd



Notes: This figure presents the relative disagreement between parents and students about the intensity of their preference for going to college or vocational training (on the x-axis) and the difference between students' continuous in the public vs. the private condition (on the y-axis). Students and parents were asked how much they prefer to pursue vocational training vs. going to college on a scale of 0 to 100, where 0 stands for "vocational training for sure" and 100 represents "college for sure". The values on the x-axis display the difference between the mean value among parents in the private condition and the mean value among students in the private condition. The y-axis displays the coefficient of regressing students' stated values on a dummy for being in the public condition and the 95 percent confidence interval (based on robust standard errors). 259 Students part of the visibility experiment gave their rating in the private condition and 305 Parents with a child part of the visibility experiment and in the private condition did so. The coefficients for the difference between the public and private conditions is based on 542 students part of the visibility experiment who stated a continuous preference for the two alternatives.

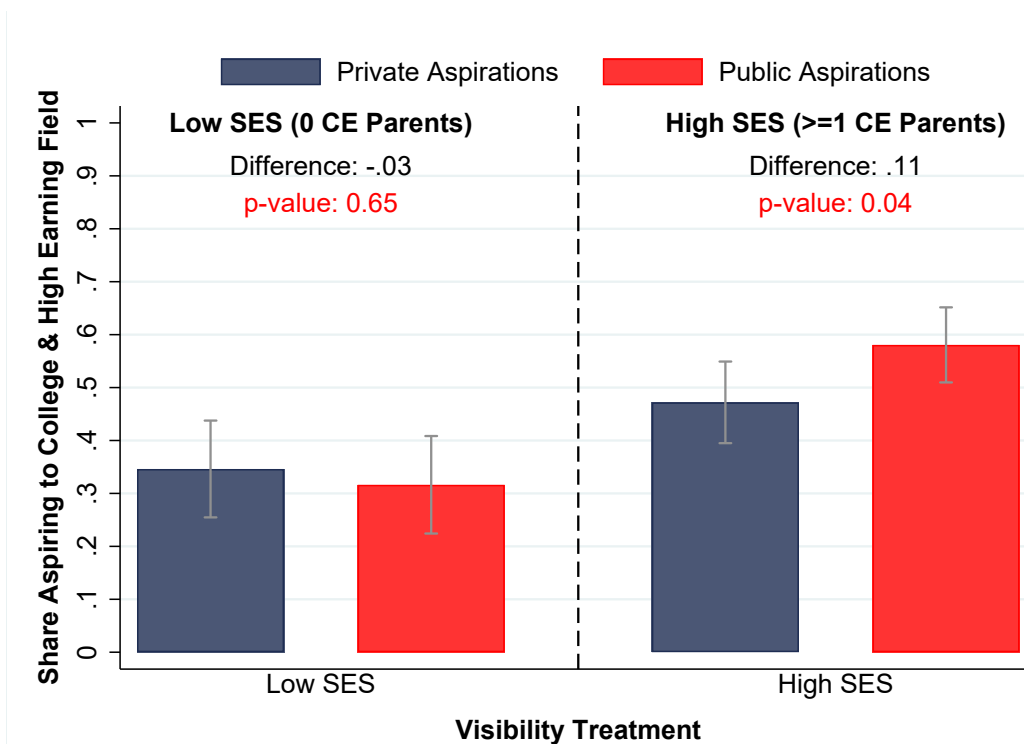
Figure B.4: Visibility Treatment: Preferences for high earning fields by family background



Notes: This figure presents the means and the 95 percent confidence intervals of the share of students aspiring to a high earning field in the private and the public condition, separately for students without any college-educated parent (“0 CE Parents”), with one college-educated parent (“1 CE Parent”) or two college-educated parents (“2 CE Parents”). The graph is based on 523 students in the visibility experiment who did rate the attractiveness of different fields. 183 students in this group do not have any college-educated parent, 156 have one college-educated parent and 184 have two college-educated parents. The graph reports the p-value of the pairwise difference between the shares in the private and the public condition for these three groups of students.

The dummy for aspiring to a high earning fields takes the value of 1 if a student aspires to one of the five fields with the highest average earnings among graduates of the respective field. The five fields with the highest average earnings among graduates are the following: “Business and Economics”; “Engineering”; “Maths, Natural Sciences”; “Law”; “Medical Studies”. Accordingly, the five fields with relatively lower earnings are: “Agriculture and Forestry”; “Arts, Music, Design”; “Education”; “Linguistics and Culture”; “Social Sciences”.

Figure B.5: Private and Public Aspirations for High Earning Field at College by SES

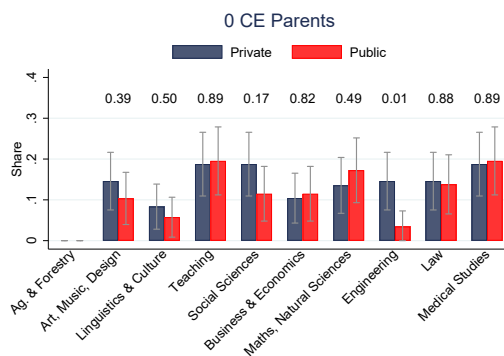


Notes: This figure presents the means and the 95 percent confidence intervals of the share of students who aspire to university AND to a high earning field at university in the private and the public condition, separately for students without any college-educated parent on the left side (termed “low SES (0 CE Parents)”) and students with at least one college-educated parent on the right side (termed “high SES (≥ 1 CE Parents)”). The graph is based on 523 students in the visibility experiment who did rate the attractiveness of different fields. 183 students in this group do not have any college-educated parent and 340 have at least one college-educated parent. The graph reports the p-value of the pairwise difference between the shares in the private and the public condition for low and high SES students.

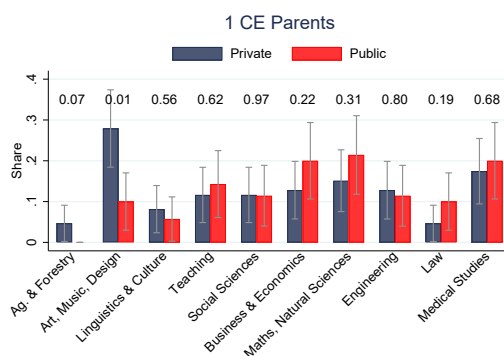
The dummy for aspiring to a high earning fields takes the value of 1 if a student aspires to one of the five fields with the highest average earnings among graduates of the respective field. The five fields with the highest average earnings among graduates are the following: “Business and Economics”; “Engineering”; “Maths, Natural Sciences”; “Law”; “Medical Studies”. Accordingly, the five fields with relatively lower earnings are: “Agriculture and Forestry”; “Arts, Music, Design”; “Education”; “Linguistics and Culture”; “Social Sciences”.

Figure B.6: Visibility Experiment: Effects by Parental Background

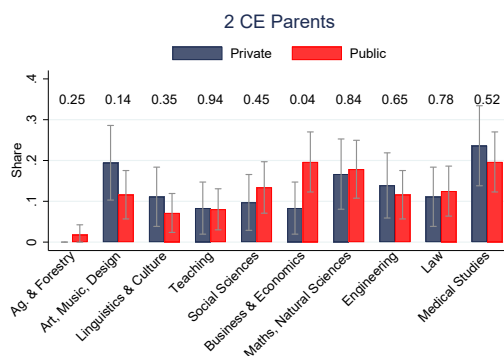
(a) 0 College-Educated Parents



(b) 1 College-Educated Parents

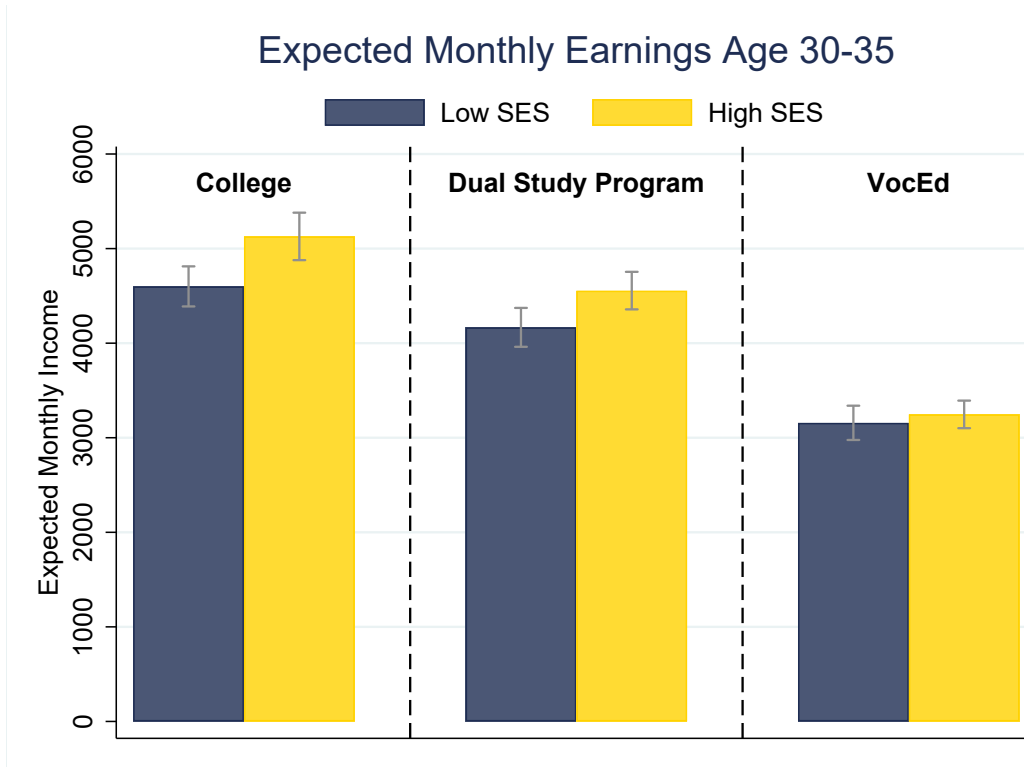


(c) 2 College-Educated Parents



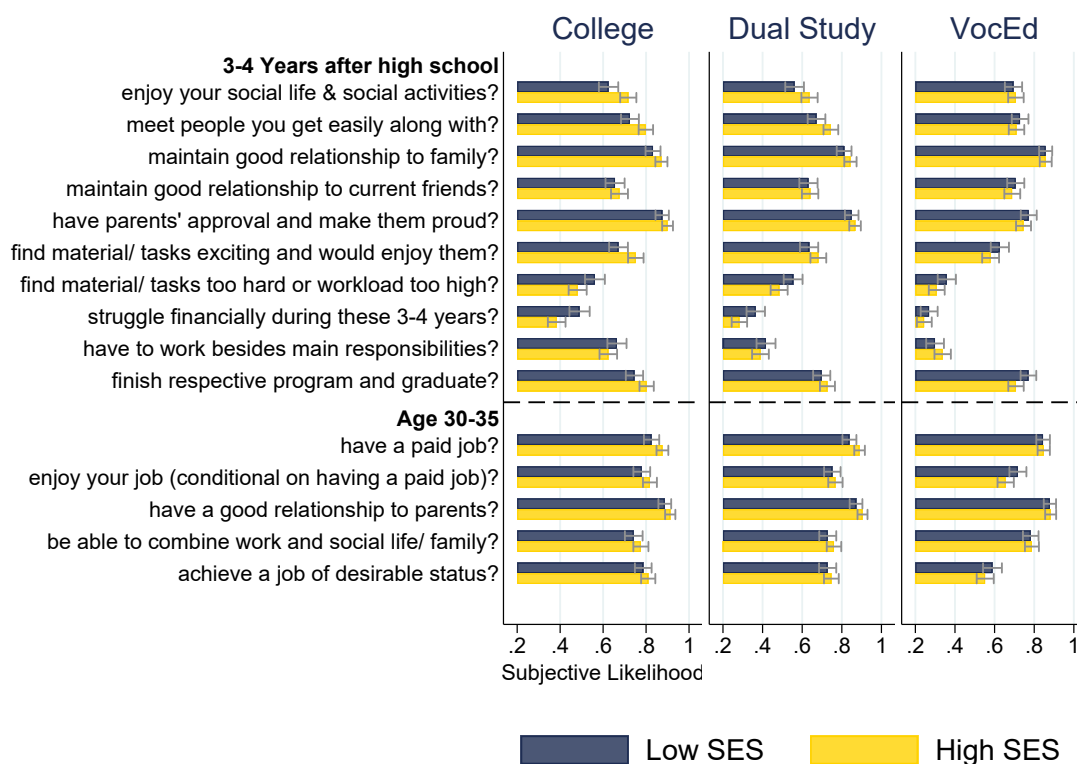
Notes: This graph reports the share (and 95% CI) of 523 students aspiring to the different fields of study in the *private* and the *public* condition, separately for those with 0, 1 and 2 college-educated parents. The p-values reported indicate a simple comparison between these groups.

Figure B.7: Expected Monthly Earnings (Gross) at an age of 30-35



Notes: This graph portrays the mean (and 95% confidence interval) of students' answer to following question about their likely gross income at an age of 30 to 35: "Assuming you work full-time and there is no inflation, which monthly gross income (before taxes) in € do you consider likely for yourself at an age of 30 to 35 in each scenario (college, dual study program, vocational training)?" Expectations are reported separately for students from low and high SES families.

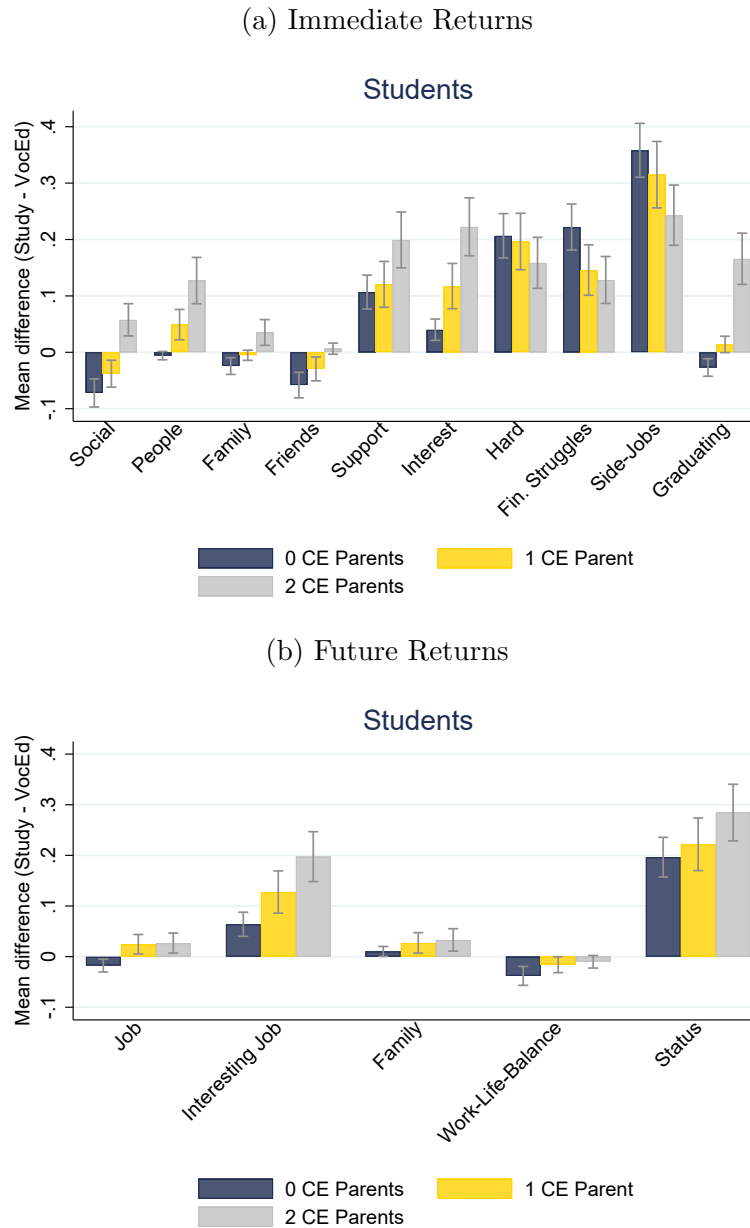
Figure B.8: Subjective Beliefs for immediate and future scenarios



Notes: This figure presents the mean (and 95% confidence interval) of students' (likelihood) beliefs for the 15 scenarios detailed presented to students. Beliefs are reported for both students from low and high SES families and presented for college, dual study programs and vocational training. Parents were asked equivalent questions for their children's future (with the exception of the question about friends). The introduction to the scenarios was the following for **Scenarios 3-4 Years after High School**: "Try to imagine your life during the 3 to 4 years after high school (and a potential gap year) for the cases that you pursue vocational training, a dual study program or undergraduate studies. How would you imagine your life to be during those 3-4 years in these scenarios? Please estimate for all three scenarios (undergraduate studies, dual study programs, vocational training), how certain you are on a scale of 0 ("extremely unlikely") to 100 ("absolutely certain") that you will..."

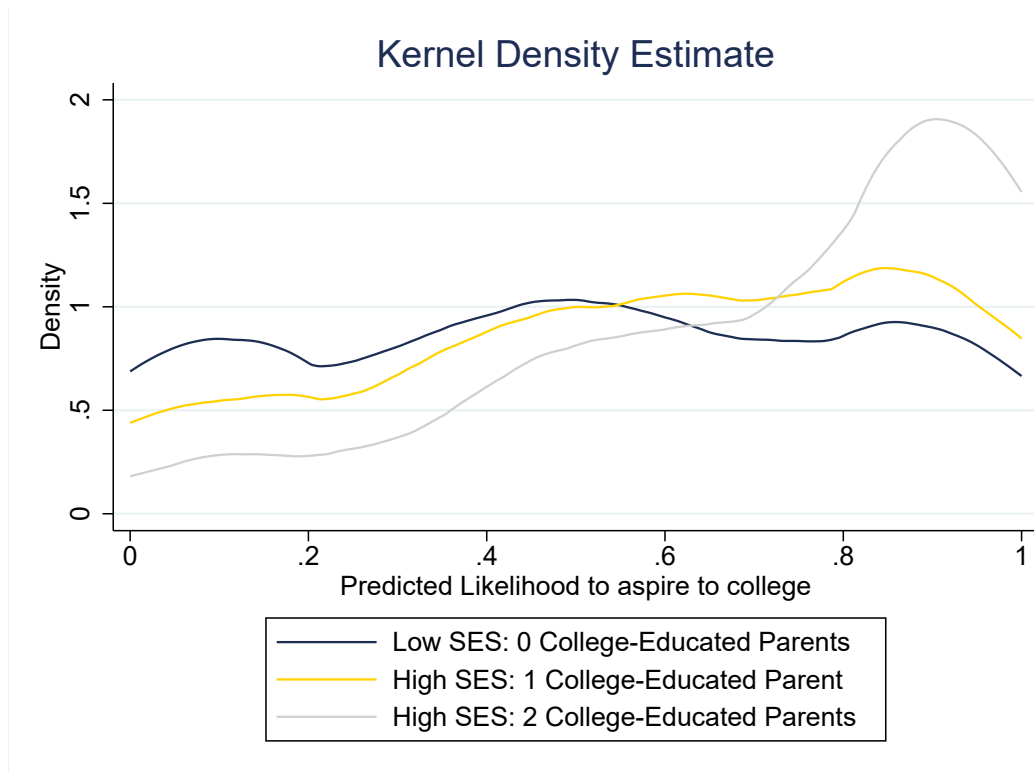
The introduction read instead for **Scenarios Age 30-35**: "Now please imagine again for all three scenarios (...) that at the age of 30 to 35 you will..."

Figure B.9: Perceived Returns of Going to College (rather than pursuing Vocational Training)



Notes: Displayed here are the perceived returns (and 95%-confidence intervals) to going to college rather than vocational training, obtained by subtracting the subjective beliefs for vocational training from those for college for each specific scenario. Positive Numbers indicate that students judge the relevant aspect to be more likely to materialize in case of going to college than when pursuing vocational training. The returns are split by the number of college-educated parents (0, 1 or 2).

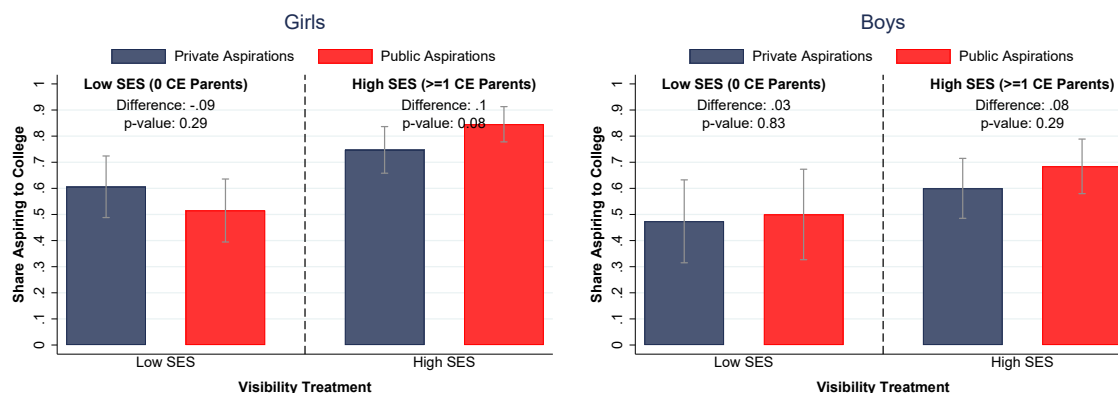
Figure B.10: Predicted Probability of Aspiring to College based on Students' Beliefs, by Parental Background



Notes: This figure visualizes the estimated kernel density of students' predicted likelihood to aspire to college based on their stated subjective beliefs, separately for those with 0, 1, and 2 college-educated parents. For each individual, a likelihood is predicted in the following way: first, I estimate the choice model for students in the private condition only (via maximum likelihood estimation of the conditional logit), separately by low and high SES background. Using these estimated utility weights, for each individual with stated subjective beliefs, I can then calculate the predicted likelihood of aspiring to college by plugging in the beliefs into the estimated subjective expected utility model.

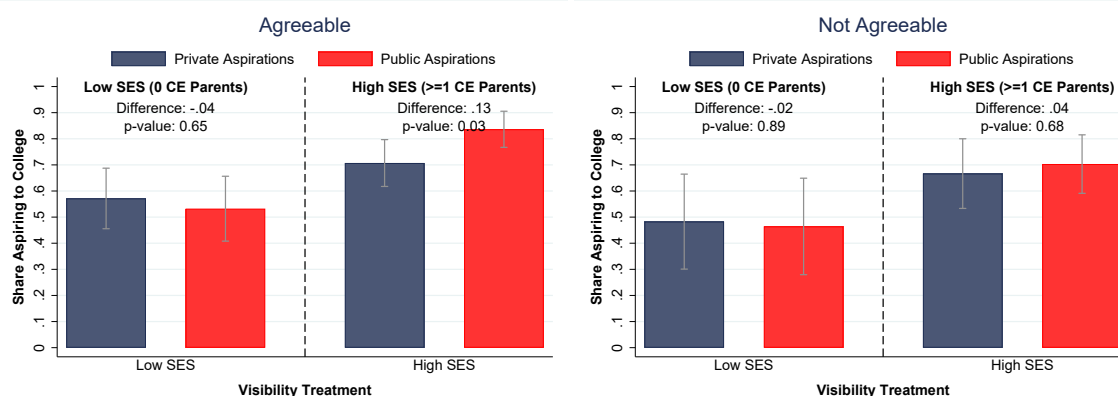
Figure B.11: Visibility Experiment and Socio-Economic Gaps

(a) By Gender



Notes: Subfigure a) splits students into girls on the left side and boys on the right side. Each of the two graphs presents the means and the 95 percent confidence intervals of the share of students aspiring to university in the private and the public condition, separately for students without any college-educated parent on the left side (termed “low SES (0 CE Parents)”) and students with at least one college-educated parent on the right side (termed “high SES (≥ 1 CE Parents)”). Students’ gender is available for all 549 students in the visibility experiment, with 333 girls and 216 boys being part of the visibility experiment. The graphs report the p-value of the pairwise difference between the shares in the private and the public condition for low and high SES students.

(b) By Agreeableness



Notes: Subfigure b) splits students into “agreeable” (on the left) and “not agreeable” (on the right) students. Agreeable students are all those who scored above the 50th percentile on agreeableness on the Big Five test (BFI-2). Each of the two graphs presents the means and the 95 percent confidence intervals of the share of students aspiring to university in the private and the public condition. The graphs report the p-value of the pairwise difference between the shares in the private and the public condition for low and high SES students.

Table B.1: **(NEPS Data)** Regression of Having Enrolled in College at some point by 2.5 years after finishing high school (Dependent Variable) on Students' and Parents' *Private* College Aspirations during High School (Independent Variables)

	All	0 CE Parents	≥ 1 CE Parents	Boys	Girls
Student Aspiration to Study	0.34 (0.04)	0.36 (0.05)	0.18 (0.1)	0.35 (0.07)	0.33 (0.06)
Parent Aspiration to Study	0.35 (0.04)	0.36 (0.05)	0.19 (0.09)	0.3 (0.06)	0.39 (0.06)
Interaction Term	-0.09 (0.05)	-0.1 (0.07)	0.05 (0.11)	-0.07 (0.08)	-0.11 (0.07)
Constant	0.23 (0.03)	0.18 (0.03)	0.43 (0.08)	0.24 (0.05)	0.22 (0.04)
N	2862	1465	1397	1299	1563
R-squared	0.14	0.18	0.07	0.14	0.15

Notes: Each column in this table shows a separate regression of an indicator for a student being enrolled in college either during wave 9 (1.5 years after graduating from high school) OR wave 10 (2.5 years after high school) on students' and parents' aspiration for the student to enroll. The aspiration indicators for students and parents take the value of 1 if they stated an aspiration to enroll in college in either wave 5 (grade 11) OR wave 7 (grade 12). The rows show the coefficients and in brackets below the standard errors. CE parents means "college-educated" parents. The data for this analysis is taken from the NEPS.

Table B.2: Socio-Economic Gap by GPA, Regressions for DV: Ever Enrolled in College by Wave 11

	Unconditional	Conditional
High SES	.11 (.01)	.08 (.01)
Dummies for grade average	No	Yes
Mean Low SES	.78	
N	2714	

Notes: When conditioning on grade average, the regression includes dummies for each possible grade average. Robust standard errors are reported. The sample includes all those graduating from high school in 2014 (excluding those who graduated in 2015 for now).

Table B.3: Socio-Economic Gap by GPA, Median Split; Regressions for DV: Ever Enrolled in College by Wave 11

	Above Median (2.4)		Below Median (2.4)	
	Unconditional	Conditional	Unconditional	Conditional
High SES	.03 (.01)	.02 (.01)	.15 (.02)	.14 (.02)
Dummies for GPA average	No	Yes	No	Yes
Mean Low SES	.91		.67	
N	1365		1349	

Notes: When conditioning on GPA, the regression includes dummies for each possible GPA. Robust standard errors are reported. The sample includes all those graduating from high school in 2014 (excluding those who graduated in 2015 for now). The sample is divided across the median grade of 2.4.

Table B.4: Socio-Economic Gap by Cognitive Scores, Regressions for DV: Ever Enrolled in College by Wave 11

	Unconditional	Conditional
High SES	.13 (.01)	.13 (.01)
Dummies for cognitive scores	No	Yes
Mean Low SES	.74	
N	2717	

Notes: When conditioning on cognitive scores, the regression includes dummies for each cognitive score. Robust standard errors are reported. The sample includes all those graduating from high school in 2014 (excluding those who graduated in 2015 for now).

Table B.5: Visibility Treatment for Students with 1 CE-Parent: Parents' Registration Status

	DV: College Aspiration			
	(1)	(2)	(3)	(4)
	Non-CE Parent only	CE-Parent only	Both Parents	CE Parent
Public	.068 (.20)	.110 (.09)	.108 (.12)	.170** (.08)
N	40	50	70	120
R^2	.44	.46	.42	.28
School-FE	YES	YES	YES	YES
Clustered SE	School	School	School	School

Notes: Each column reports the result of regressing students' college aspiration on a dummy for being in the public condition for students with 1 college-educated parent. The column labels describe whether only the parent without college education was registered (column 1), only the college-educated parent was registered (2), both parents were registered (3) or whether the college-educated parent registered at all or not. Robust standard errors are reported in brackets below coefficients, *** $p < .01$, ** $p < .05$, * $p < .1$

Table B.6: Intergenerational Transmission of Beliefs: Perceived Returns to College vs. Vocational Training

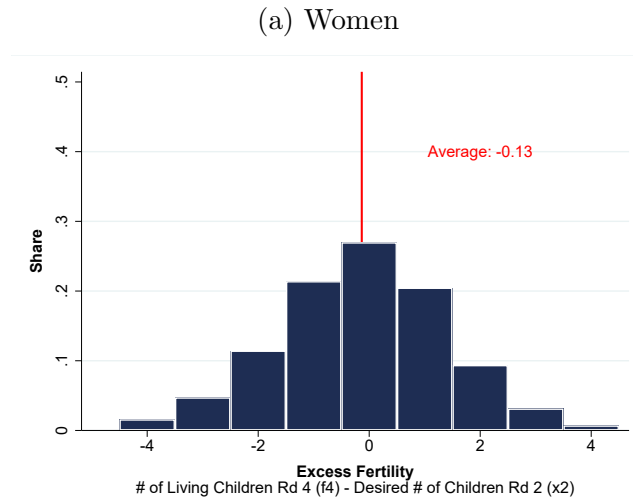
Dep. Variable	Independent Variables			N	R ²
$(\pi_{s1k} - \pi_{s3k})$	Parents' Beliefs $(\pi_{p1k} - \pi_{p3k})$	High SES	Constant		
Scenarios Next 3-4 Years					
Social	.26*** (.07)	.05 (.03)	-.06** (.03)	565	.07
People	.35*** (.07)	.07** (.03)	-.02 (.02)	561	.11
Family	.25** (.12)	.03* (.02)	-.03* (.02)	563	.05
Support	.39*** (.07)	.04* (.02)	.08*** (.02)	549	.08
Interest	.61*** (.06)	.06** (.03)	.03 (.02)	547	.3
Hard	.13** (.05)	-.01 (.03)	.16*** (.02)	522	.02
Financial	.07 (.05)	-.07*** (.03)	.22*** (.02)	476	.03
Side-Jobs	.18*** (.05)	-.04 (.04)	.29*** (.04)	447	.03
Graduating	.36*** (.05)	.05* (.03)	.02 (.03)	549	.13
Scenarios Age 30-35					
(Paid) Job	.1** (.04)	.06*** (.02)	-.03* (.02)	556	.03
Interesting Job	.4*** (.06)	.08*** (.03)	.02 (.02)	544	.15
Work-Life-Balance	0 (.05)	.02 (.02)	-.04** (.02)	546	0
Family	0 (.02)	.01 (.01)	.01 (.01)	557	0
Status	.31*** (.06)	.02 (.03)	.2*** (.03)	509	.07

Notes: The table presents regression of students' beliefs – their perceived returns to college vs. vocational training: $\pi_{s1k} - \pi_{s3k}$ – on parents' beliefs ($\pi_{p1k} - \pi_{p3k}$), a dummy indicating a high SES family and a constant. Each row represents an individual regression for the relevant scenario. Robust standard errors are included in brackets below the coefficients and significance levels indicated by * $p < .1$, ** $p < .05$, *** $p < .01$. The number N indicates the number of student-parent-pairs with observations for each row.

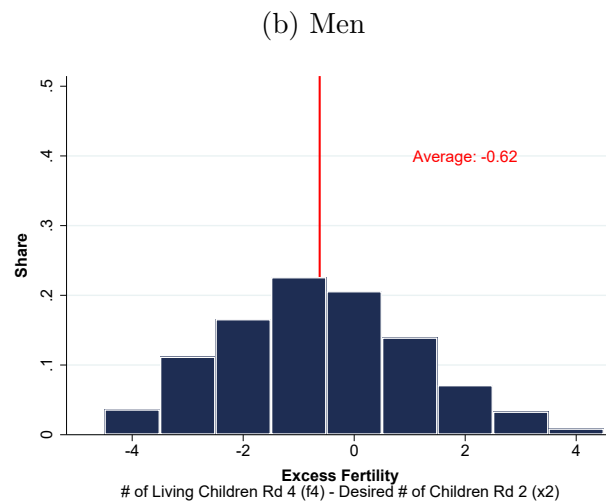
Appendix C

Appendix Tables & Figures Chapter 3

Figure C.1: Excess Fertility (Number of living children at round 4 against the desired number of children at round 2) for Women and Men

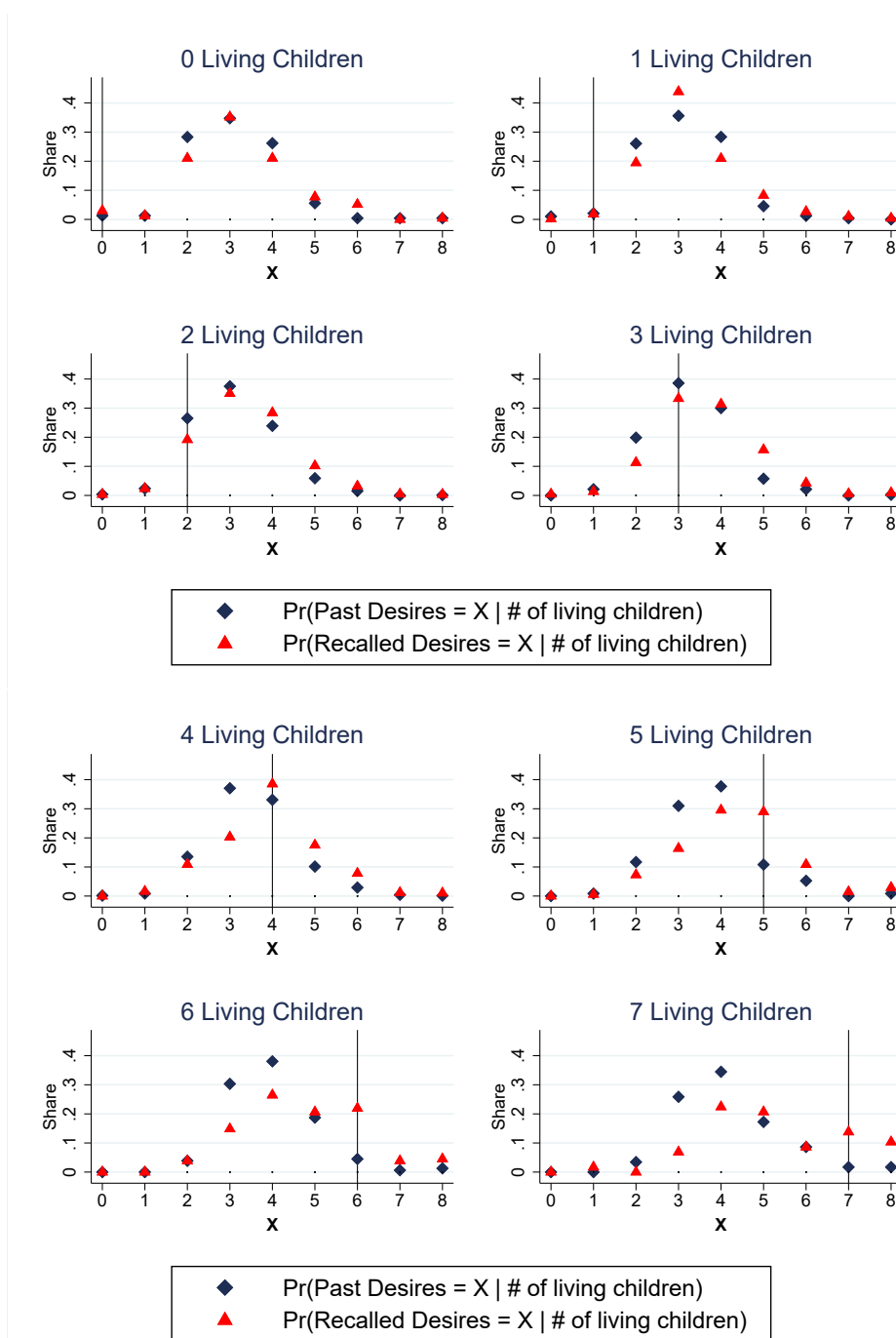


Notes: This panel shows the distribution of excess fertility (number of living children at round 4 (f_4) against the desired number of children at round 2 (x_2)) for the 1937 women with excess fertility between -4 and +4.



Notes: This panel shows the distribution of excess fertility (number of living children at round 4 (f_4) against the desired number of children at round 2 (x_2)) for the 1892 men with excess fertility between -4 and +4.

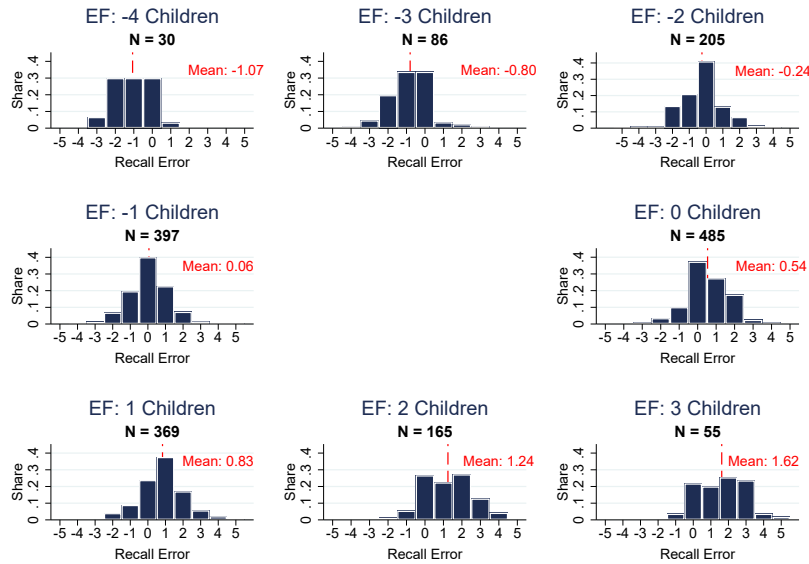
Figure C.2: Distribution of Past Reproductive Desires and Recalled Reproductive Desires by Number of Living Children in Survey Round 4



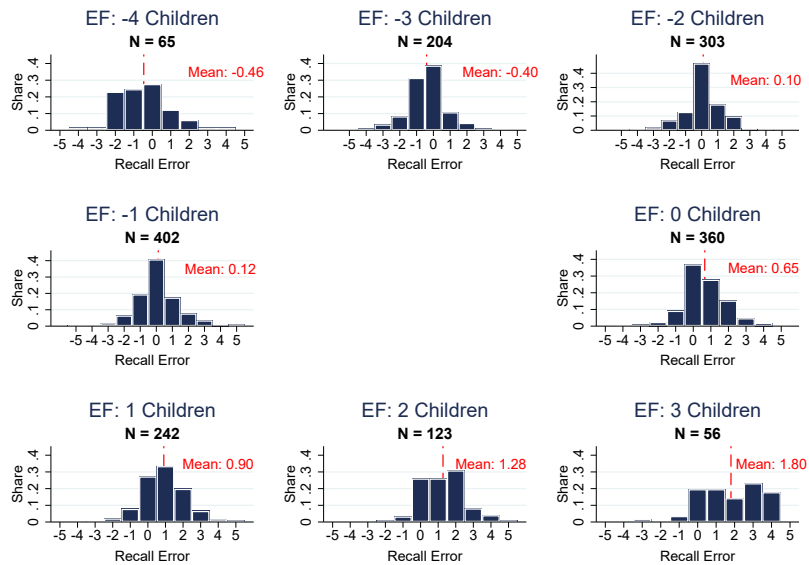
Notes: This figure shows the conditional mean and the 95%-confidence interval for the past desires and recalled desires conditional on the number of living children at survey round 4.

Figure C.3: Recall Error by Excess Fertility (EF) [$f_4 - x_2$]

(a) **Women**

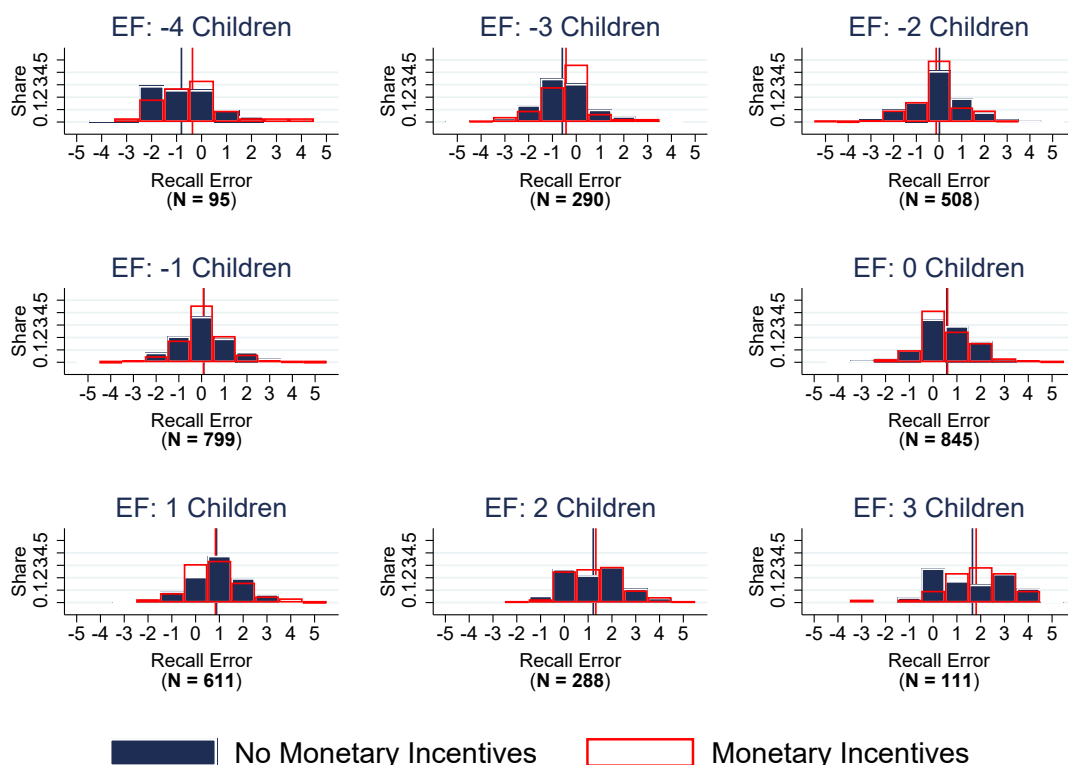


(b) **Men**



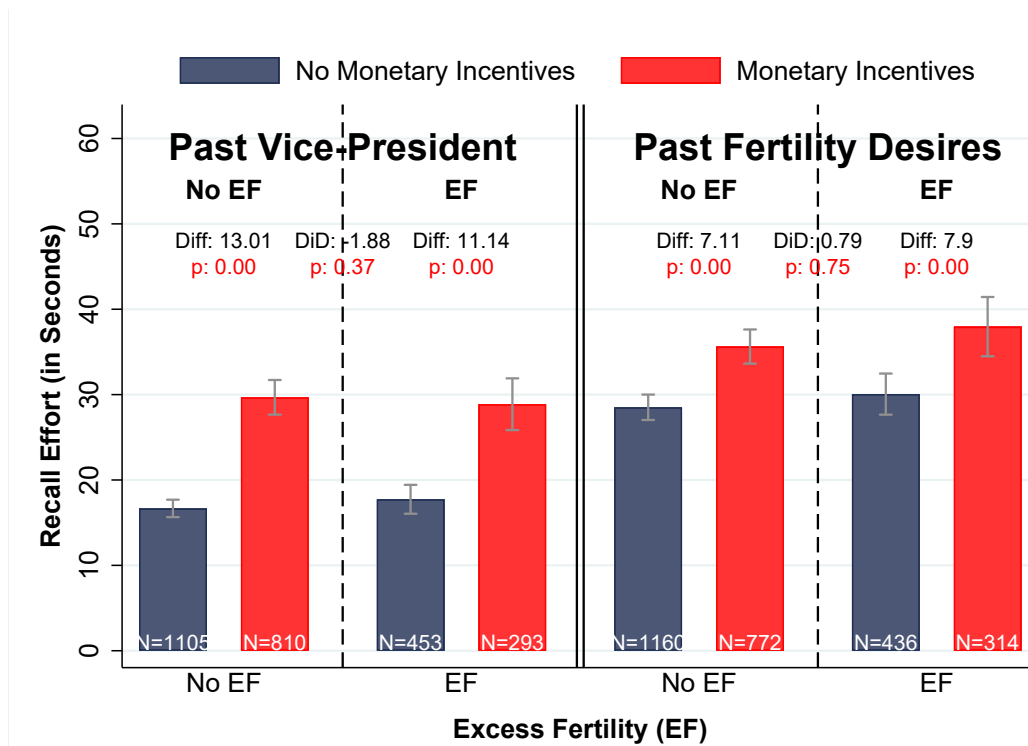
Notes: This figure shows the distribution of recall errors conditional on excess fertility as measured by the difference between number of living children at round 4 minus the desired number of children at round 2. The number of observations for each graph is indicated above each graph. Results are reported separately for women (panel a) and men (panel b).

Figure C.4: Monetary Incentives vs. No Monetary Incentives: Recall Errors by Excess Fertility (Number Children Round 4 - Desired Number of Children Round 2)



Notes: These graphs show the distribution of recall errors conditional on the extent of excess fertility, separately for those who did or did not receive monetary incentives to correctly recall their past desires. The lines indicate the average recall error for these two groups.

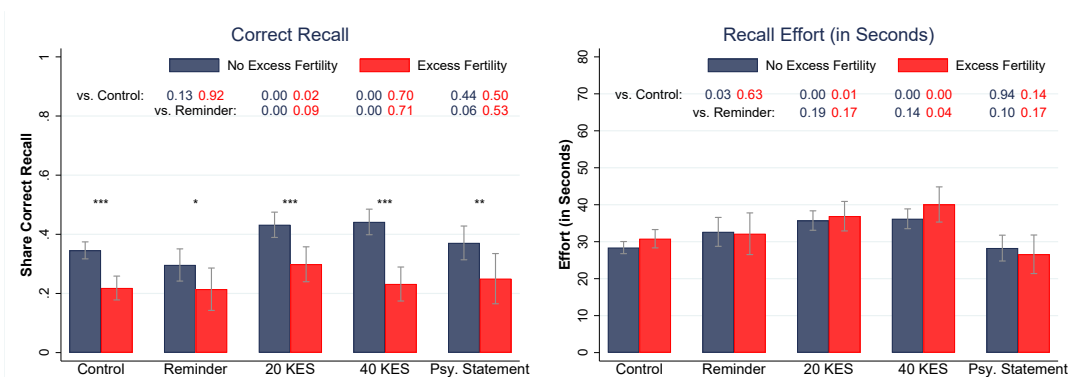
Figure C.5: Recall Effort and Monetary Incentives: Past Vice-President and Past Fertility Desires



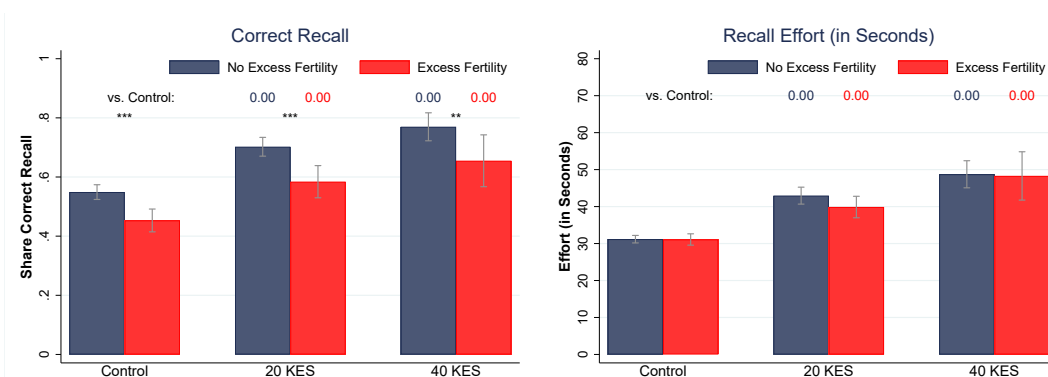
Notes: This graph shows the effort in seconds (and 95%-CI) of respondents trying to recall the past vice-president and their past fertility desires conditional on being offered monetary incentives (in red) or not (in blue) and separately for those with and without excess fertility. The difference between these two groups is reported after “Diff:”, with p-values of these pairwise comparisons below in red. The difference-in-difference for each of the two memory questions is reported after “DiD:” and p-values are reported below in red. The sample comprises all those who participated in round 2, knew the name of the vice-president in round 2 and gave an answer to both questions in this survey round. The sample is furthermore restricted to those taking less than 5 minutes to remember either question.

Figure C.6: Recall Performance & Experimental Conditions: Past Reproductive Desires & Past Vice-President

(a) Past Reproductive Desires

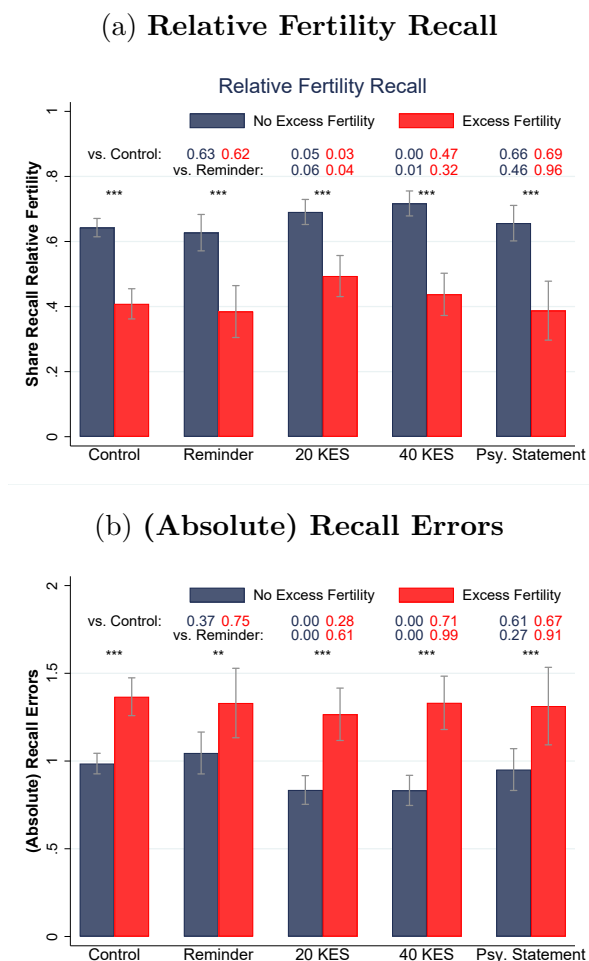


(b) Past Vice-President



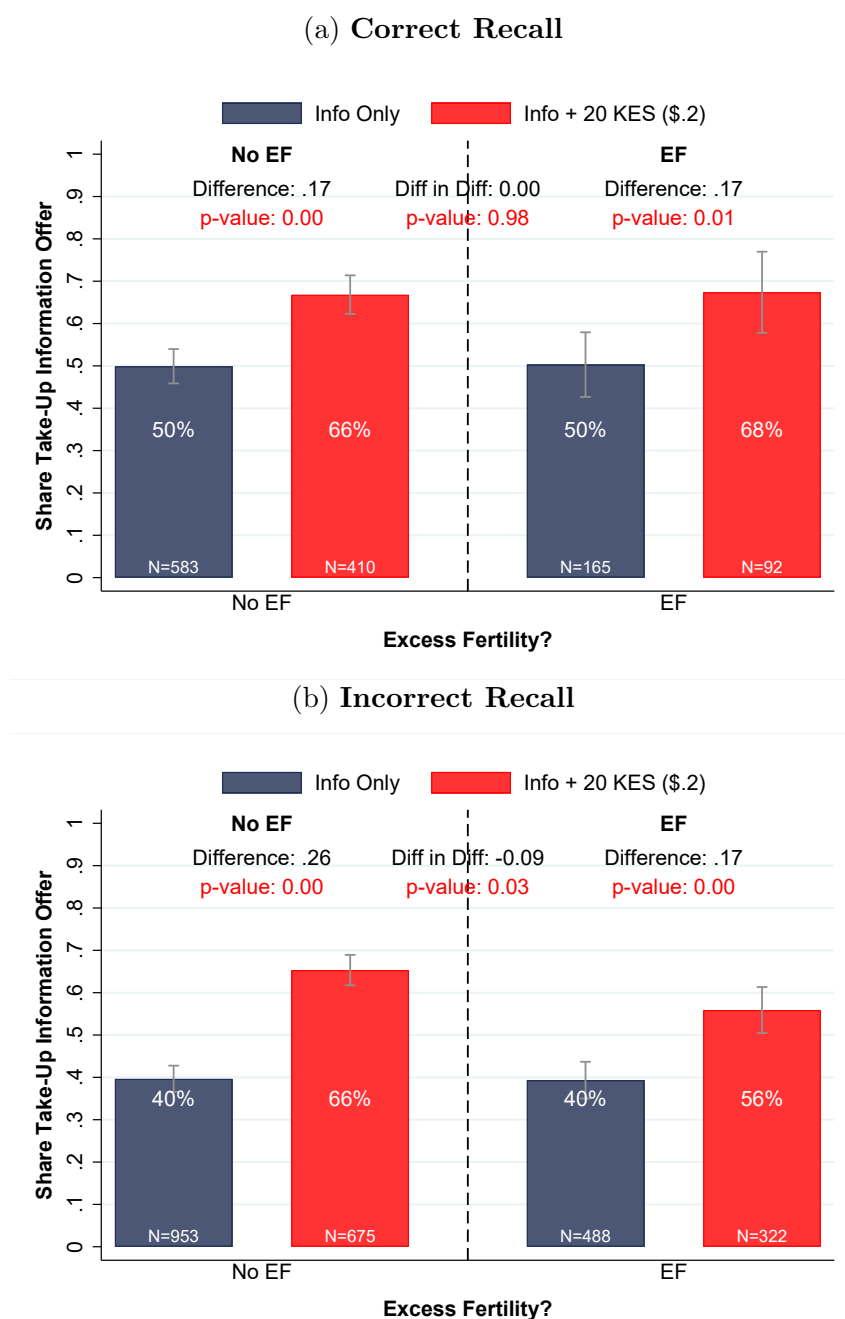
Notes: These graphs report the share (and 95%-CI) of respondents correctly recalling how many children they wanted in the year of survey round 2 (panel a), top) and correctly recalling the past vice-president at the time (panel b), left side) as well as the time (and 95%-CI) spent on each question (bottom of panel a) and right side panel b)). The stars indicate the significance-level of pairwise comparisons between those with and without excess fertility conditional on the experimental condition, the remaining p-values indicate testing performance against the control or reminder version, respectively.

Figure C.7: Fertility Recall Performance & Experimental Conditions: Relative Fertility Recall, Recall Errors & Absolute Recall Errors



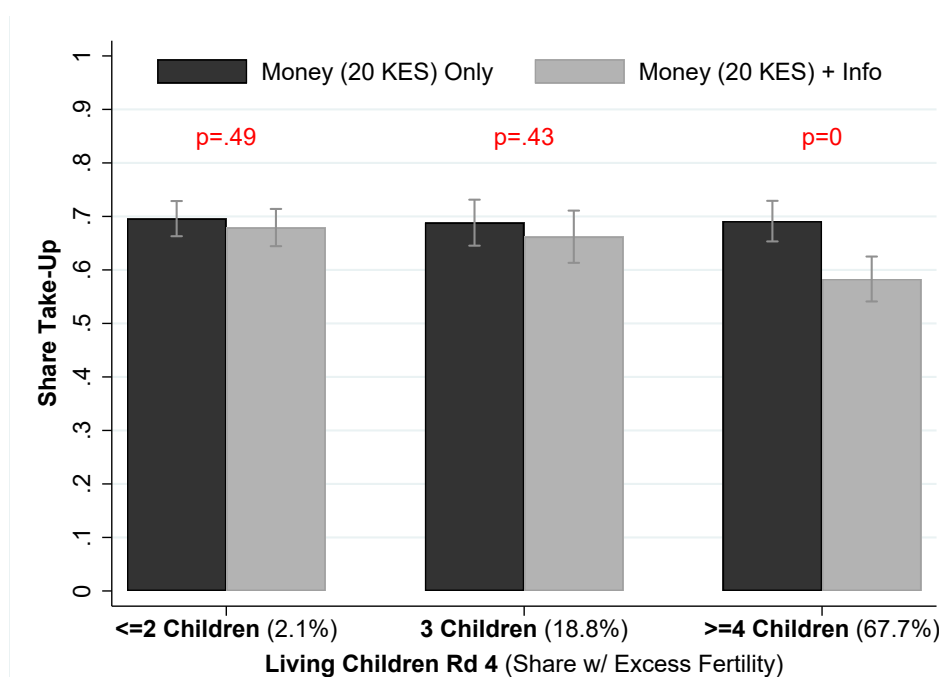
Notes: These graphs report the shares (and 95%-CI) of respondents correctly recalling whether they have more or fewer children than they desired in the past (panel a)) and the absolute average recall errors (and 95%-CI) (panel c). The measures are constructed in the following way: recalling relative fertility is indicated by $sgn(f_4 - x_{2|4}^R) = sgn(f_4 - x_2)$, absolute recall errors are constructed as follows: $|x_{2|4}^R - x_2|$. The stars indicate the significance-level of pairwise comparisons between those with and without excess fertility conditional on the experimental condition, the remaining p-values indicate testing performance against the control or reminder version, respectively.

Figure C.8: Information Take-Up by Excess Fertility & Experimental Condition conditional on Correct and Incorrect Recall of Round 2 Fertility Desires



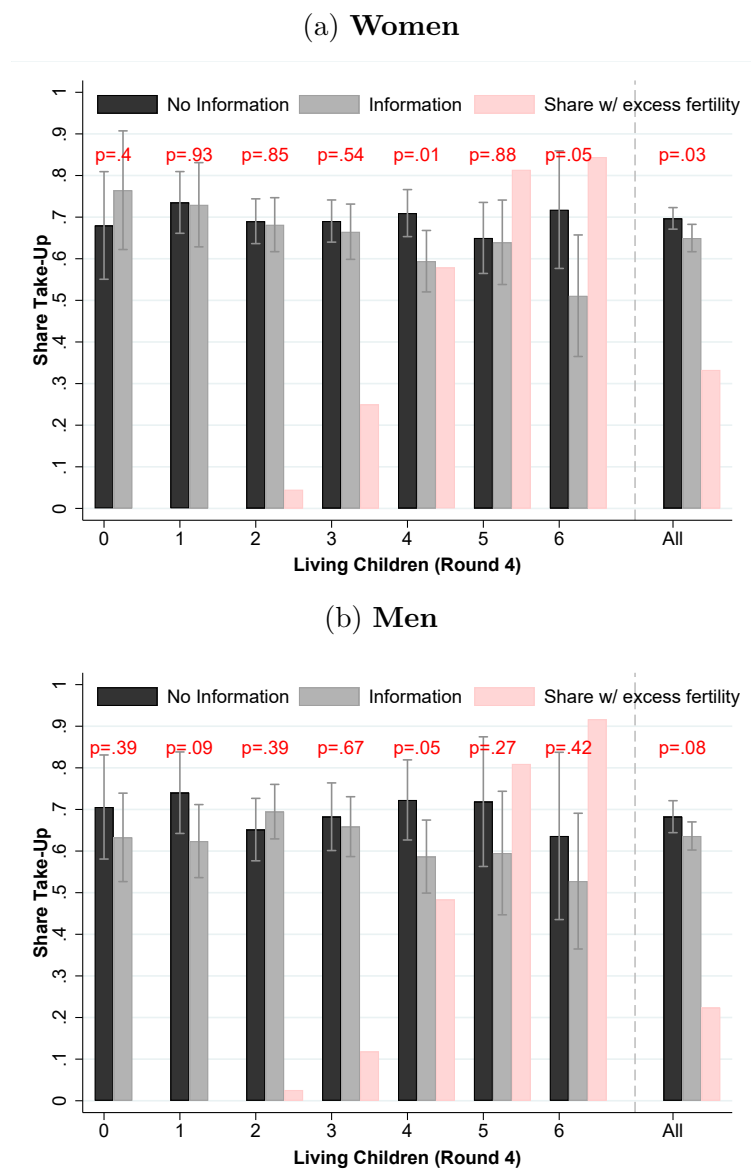
Notes: These graphs report the share (and 95%-CI) of respondents taking up the information offer depending on the experimental condition and excess fertility (i.e. whether they have more children than desired in the past or not). Results are reported separately for those who do correctly recall their past desired number of children (panel (a)) and those who do not correctly recall their past desired number of children (panel (b)).

Figure C.9: Information Take-Up for those offered 20 KES together with or without information



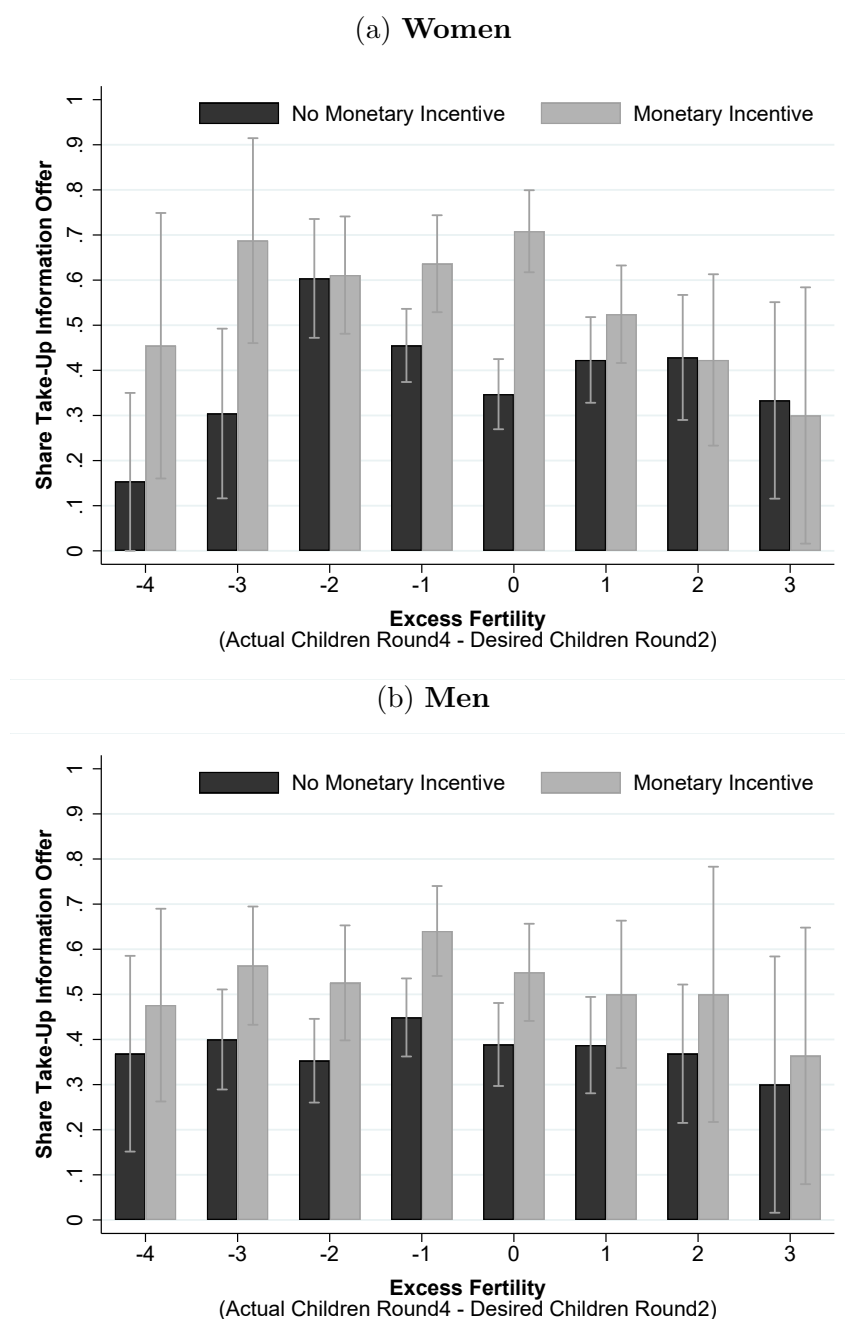
Notes: This graph shows the share (and 95%-CI) of respondents taking up the reminder offer to earn KES 20 (\$.2) depending on being offered additional information on past fertility desires or not and conditional on the number of children: 2 or fewer children, 3 children or 4 or more children. The share in the parentheses behind the number of children indicates the share of respondents for whom their number of children is higher than they desired 10 years ago. The p-value reported is for a simple pairwise comparison of shares. Respondents who were not surveyed in round 2 are offered the monetary incentive without any additional information offered as for them we do not know how many children they desired in round 2 (bars in black). Respondents who are being offered the monetary incentive together with information on their past desires are those who were interviewed in round 2 and were selected at random to be offered the information together with a monetary incentive.

Figure C.10: Information Take-Up for those offered 20 KES together with or without information



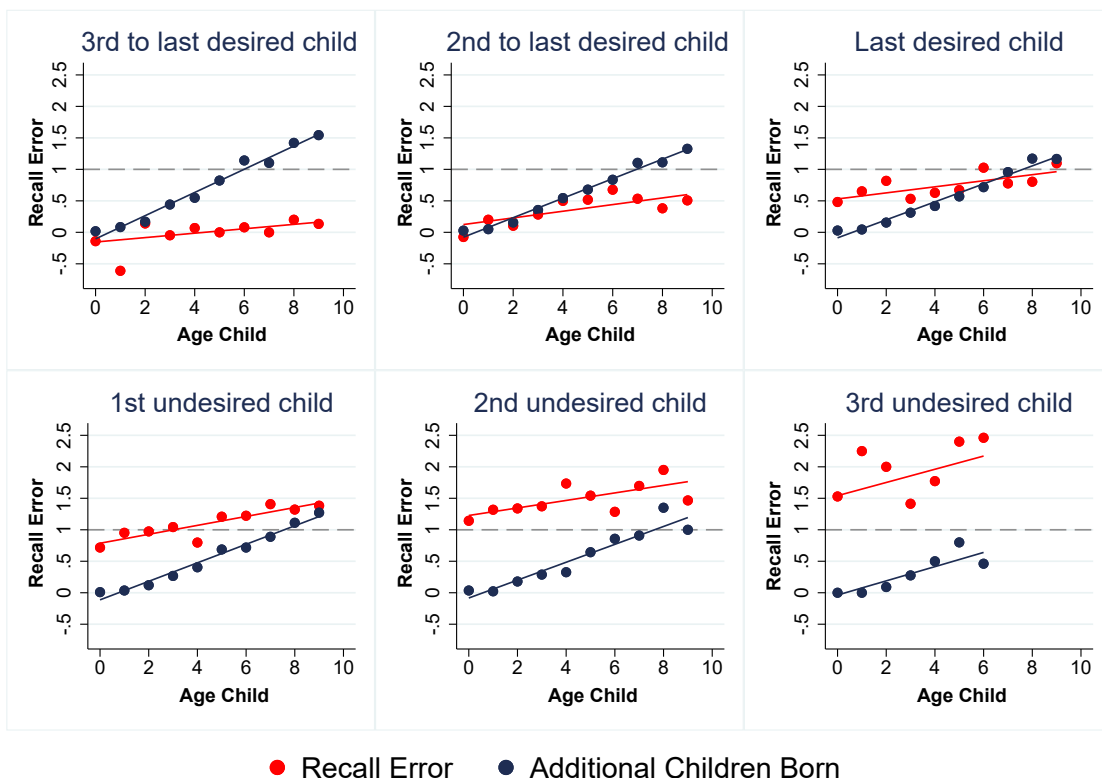
Notes: These graphs show the share (95%-CI) of women and men taking up the reminder offer to earn KES 20. Conditional on the number of living children, it compares those who are offered the information about their past desires in survey round 2 with those who are offered no additional information about their past desires, the p-value of the pairwise difference is indicate above the bars. The latter group is comprised of those who did not participate in survey round 2 (such that we do not have any information we could share) and is offered to receive KES 20 against a reminder, whereas the former group are all those who did participate in survey round 2 and are randomly drawn to receive the information offer together with KES 20. The share of respondents with excess fertility in red is based on those who participated in survey round 2.

Figure C.11: Information Take-Up by Excess Fertility and Monetary Incentives (Wave 1)



Notes: These graphs show the share (95%-CI) of women and men in wave 1 taking up the information offer depending on whether it is coupled with monetary incentives of KES20 or not, conditional on how many more children they have than they desired in the past.

Figure C.12: Dynamics of Recall: Recall Errors by age of x^{th} to last desired child and y^{th} undesired child (Bin-Scatter)



Notes: These six panels differentiate between whether a child was the last desired child according to a respondents' desires in survey round 2 or whether it was the first, second or third undesired child (in the bottom row) or the third or second to last desired child. For each panel, it shows respondents' recall errors and the number of additional children born conditional on the respective child's age (or years since birth of the respective child). These are bin-scatter-plots with the best linear fit presented. The sample is restricted to those whose recall errors are between -10 and +10 and there must be at least 25 observations for a given age in each panel for the data to be shown.

Table C.1: Regressions: Recall Performance of Past Fertility Desires and Excess Fertility

	Dependent Variable								
	Correct Recall ($x_{2 4}^R = x_2$)			Recall Relative Fertility $sgn(f_4 - x_{2 4}^R) = sgn(f_4 - x_2)$			Absolute Recall Mistake ($ x_{2 4}^R - x_2 $)		
	All	Women	Men	All	Women	Men	All	Women	Men
Excess Fertility (EF)	-.13*** (.02)	-.12*** (.02)	-.14*** (.03)	-.17*** (.02)	-.13*** (.03)	-.21*** (.03)	.37*** (.04)	.34*** (.05)	.43*** (.07)
Round 2 Desires FE	✓								
Mean (if $EF = 0$)	.39	.38	.39	.67	.62	.72	.97	.93	1.01
N	3627	1804	1823	3627	1804	1823	3627	1804	1823
R^2	.04	.04	.04	.06	.05	.07	.11	.12	.1

Notes: Each column presents the results for a separate regression of the indicated dependent variable on a dummy indicating excess fertility and fixed effects for each possible desire stated in round 2 for the relevant subgroup. Standard errors are indicated in brackets below the coefficients, significance levels indicated by *** : .01, ** : .05, * : .1. The sample is restricted to those whose past desires and recalled desires are 10 children or lower.

Table C.2: Correct Recall of Past Vice-President (VP) and Past Fertility Desires: Excess Fertility (EF) & Monetary Incentives (conditional on knowing VP at Round 2)

	Dep. Var.: Correct Recall		
	(1)	(2)	(3)
VP [α_0]	.59*** (.01)	.4*** (.08)	.28*** (.09)
VP: Excess Fertility (EF) [β_1]	-.09*** (.03)	-.09*** (.03)	-.1*** (.03)
VP: Monetary Incentives (\$\$) [β_2]	.16*** (.02)	.16*** (.02)	.17*** (.02)
VP: Excess Fertility x \$\$ [β_3]	.01 (.04)	.01 (.04)	.01 (.04)
Fertility Question [γ_0]	-.24*** (.02)	-.24*** (.02)	-.13*** (.02)
Fertility Q x EF [γ_1]	-.01 (.03)	-.01 (.03)	0 (.04)
Fertility Question x \$\$ [γ_2]	-.06*** (.03)	-.07** (.03)	-.08*** (.03)
Fertility Question x EF x \$\$ [γ_3]	-.09 (.05)	-.09* (.05)	-.09* (.05)
Indicators for Past Desires		✓	✓
Indicator Male (+ Interactions)			✓
Observations	6342	6342	6342
R^2	.11	.11	.14

Notes: This table reports the results from pooled regressions of recall performance for both the past vice-president and the past fertility desires questions. Key indicators that are interacted with dummies for the vice-president and the fertility desires questions are Excess Fertility and Monetary Incentives and their interaction terms. The sample is restricted to those who knew the name of the vice-president during the time of their KLPS-2 interview, those with past desires of 8 or fewer children and those who answered both questions. Robust standard errors are reported in parentheses below the coefficients. Stars indicate significance levels: * : .1, ** : .05, *** : .01. The estimated regression equation is the following: $\text{Correct Recall}_i = \alpha_0 + \beta_1 \text{EF}_i + \beta_2 \text{Money}_i + \beta_3 (\text{EF} \times \text{Money})_i + \gamma_0 \text{Fertility Q}_i + \gamma_1 (\text{Fertility Q} \times \text{EF})_i + \gamma_2 (\text{Fertility Q} \times \text{Money})_i + \gamma_3 (\text{Fertility Q} \times \text{EF} \times \text{Money})_i + \epsilon_i$.

Table C.3: Regressions for Respondents' Intergenerational Advice of how many children to have on Recalled Reproductive Desires, Past and Current Reproductive and Beliefs about Local Family Size Norms

DV: Recommended # of Children to 18-year-old						
	Wave 1			Wave 1 & 2		
	All (1)	Women (2)	Men (3)	All (4)	Women (5)	Men (6)
Recalled Desires	.18*** (.02)	.24*** (.04)	.13*** (.03)	.17*** (.02)	.19*** (.03)	.15*** (.02)
Past Desires (Rd 2)	.02 (.03)	-.05 (.04)	.07** (.03)	.03 (.02)	-.02 (.03)	.08*** (.03)
Current Desires (Rd 4)	.13*** (.03)	0 (.04)	.22*** (.05)	.15*** (.02)	.07** (.03)	.2*** (.03)
Local Norm Beliefs (Rd 4)	.1*** (.02)	.08*** (.02)	.12*** (.02)			
Constant	1.45*** (.12)	1.99*** (.17)	1.06*** (.17)	1.81*** (.08)	2.15*** (.11)	1.54*** (.11)
Unconditional Mean	3.13	3.04	3.22	3.13	3.06	3.21
N	1848	917	931	3599	1795	1804
R ²	.15	.08	.25	.12	.07	.18

Notes: Each column presents coefficients and standard errors (in brackets) for a separate regression of respondents' recommended number of children to 18-year-old girls (for women) and boys (for men). Respondents' beliefs about local norm was only elicited in wave 1 of survey round 4: such that columns (1)-(3) report results for wave 1 including which number of children respondents believed to be the local norm and columns (4)-(6) report results for waves 1 and 2 without respondents' beliefs about local norms as independent variable. Significance levels are indicated by *** : .01, ** : .05, * : .1. Observations are limited to those answering 10 or less to the dependent variable and the independent variables.

Table C.4: Regressions for Respondents' Intergenerational Advice of **when to get married** on Overestimating One's Past Desires, Recall Error and Interaction of these two

	DV: Recommended Age to Get Married								
	(1)	All		(4)	Women		(7)	Men	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Overestimate Past Desires	-.14 (.19)		0 (.24)	-.70*** (.25)		.01 (.37)	.3 (.27)		.3 (.31)
Recall Error		-.06 (.06)	-.02 (.13)		-.39*** (.1)	-.52*** (.18)		.06 (.07)	.31 (.19)
Overestimate X Error			-.05 (.16)			.2 (.26)			-.38* (.21)
FE Past Desires		✓			✓			✓	
FE Living Children		✓			✓			✓	
Unconditional Mean		25.82			25.36			26.27	
N	1906	1906	1906	941	941	941	965	965	965
R ²	.05	.05	.05	.13	.14	.14	.05	.05	.05

Notes: Each column presents coefficients and standard errors (in brackets) for a separate regression of respondents' recommended age to marry to 18-year-old girls (for women) and boys (for men). Since this question was posed to respondents only during wave 1, the number of observations here is smaller than for table 3.4. Significance levels are indicated by *** : .01, ** : .05, * : .1. Observations are limited to those with recall errors between -10 and 10.

Table C.5: Information Take-Up by Monetary Incentives and Excess Fertility

	Waves 1 + 2			Wave 1			Wave 2		
	All (1)	Women (2)	Men (3)	All (4)	Women (5)	Men (6)	All (7)	Women (8)	Men (9)
Excess Fertility (EF)	-.02 (.02)	-.01 (.03)	-.03 (.03)	-.02 (.03)	-.02 (.05)	-.02 (.05)	-.03 (.03)	-.01 (.04)	-.06 (.04)
KES20 Incentive	.22***	.25***	.19***	.21***	.24***	.17***	.23***	.25***	.21***
KES20 x EF	-.07* (.03)	-.09** (.05)	-.05 (.05)	-.14*** (.05)	-.19*** (.07)	-.11 (.08)	-.02 (.05)	-.01 (.06)	-.02 (.07)
Mean (EF & KES20=0)	.45	.43	.46	.4	.41	.4	.49	.46	.53
Observations	3883	1940	1943	1904	939	965	1979	1001	978
R ²	.07	.08	.07	.07	.08	.09	.08	.1	.08
FE # Desired Children					√	√			
Ind. Exp. Cond. Recall									
EF+EF×KES20 (p-val)	0	0	.09	0	0	.04	.18	.71	.14
KES20+KES20×EF (p)	0	0	0	.14	.38	.4	0	0	0

Notes: This table shows the results of regressing the information take-up on an indicator for excess fertility, an indicator for the information offer coupled with a monetary incentive of KES20 and an interaction term of these two. Controls include indicators for the number of desired children at round 2 as well as the indicators for the conditions of the recall questions. The last row displays the p-value of testing whether the monetary offer made a difference for those with excess fertility. The second to last row displays the p-value of testing whether those with excess fertility differ in terms of take-up conditional on everyone having been offered monetary incentives. Significance levels are indicated by *** : .01, ** : .05, * : .1.

Table C.6: The Dynamics of Information Take-Up: Excess Fertility & Minutes Elapsed between Information Offer and Potential Take-Up

	Information Only			Information + Money		
	All (1)	Women (2)	Men (3)	All (4)	Women (5)	Men (6)
Excess Fertility (EF)	-.0387 (.062)	.0516 (.0907)	-.1112 (.0855)	.0398 (.077)	.0162 (.1038)	.0983 (.1188)
Minutes Elapsed	-.0054*** (.0013)	-.0038* (.002)	-.0064*** (.0018)	-.008*** (.0015)	-.0063*** (.0022)	-.0096*** (.0021)
EF x Minutes Elapsed	.0005 (.0024)	-.0024 (.0035)	.0028 (.0034)	-.0054* (.003)	-.0047 (.004)	-.0084* (.0048)
Unconditional Mean (No EF)	.45	.43	.47	.66	.68	.64
Observations	2180	1084	1096	1496	769	727
R^2	.08	.07	.1	.06	.06	.08
Indicators for # of Children		✓			✓	
Indicator Exp. Conditions Recall		✓			✓	

Notes: Each column reports the results of a separate regression of an indicator for taking up the information offer on an indicator for excess fertility, the minutes elapsed between the information offer and the possibility to remind the field offer of it and the interaction term of these two. Regressions control for indicators for the number of living children and the experimental conditions of the recall question. The sample is restricted to those whose time between the offer and the decision is below the 99th percentile of minutes elapsed. Significance levels are indicated by *** : .01, ** : .05, * : .1.

Table C.7: Regressions: Recall Performance conditional on the number of additional children desired in round 4 for those still 3 or 4 children away from their initial desires

	Dependent Variable											
	Correct Recall		Recall Relative Fertility		Recall Mistake		Recall Mistake		Abs. Recall Mistake			
	$(x_{2 4}^R = x_2)$		$sgn(f_4 - x_{2 4}^R) = sgn(f_4 - x_2)$		$(x_{2 4}^R - x_2)$		$(x_{2 4}^R - x_2)$		$(x_{2 4}^R - x_2)$			
	All	Women	Men	All	Women	Men	All	Women	Men	Men		
Desires - # Children in Round 4	.05** (.02)	.12*** (.04)	.03 (.03)	.05*** (.01)	.07** (.03)	.04*** (.02)	.77*** (.1)	.54*** (.09)	.84*** (.14)	-.04 (.09)	-.37*** (.08)	.08 (.1)
Conditions Recall Q							√					
Mean	.31	.27	.33	.95	.94	.95	-.46	-.94	-.26	1.16	1.19	1.15
N	306	88	218	306	88	218	306	88	218	306	88	218
R ²	.07	.2	.05	.11	.24	.09	.39	.39	.39	.04	.3	.05

Notes: Each column presents the results for a separate regression of the indicated dependent variable on the number of additional children desired in round 4 ($= x_4 - f_4$) and fixed effects the experimental conditions of the recall conditions and being four children away from ones initial desires. Robust standard errors are indicated in brackets below the coefficients, significance levels indicated by *** : .01, ** : .05, * : .1. The sample is restricted to those whose past desires and recalled desires are 10 children or lower, who are 3 or 4 children away from their past desires and who were asked about their current desires before they were asked to recall their past desires.