A Family of Norms: Related Beliefs about Female Labor Force Participation *

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August 17, 2023

Abstract

The effects of correcting misperceptions of norms on closely related beliefs are not well understood. In survey experiments with male and female Saudi students, we confirm they underestimate the overwhelming support for women working outside of the home. However, on related questions about the effects of women working on family life and children, the revealed norms are not as supportive, and this lack of support is not overestimated. Correcting the underestimation had a negative spillover effect on one of these related beliefs and no effect on others. We discuss possible mechanisms behind this spillover effect.

*This study was approved by the UTS Human Research Ethics Committee (UTS HREC ETH18-2195) and King Saud University Research Ethics Committee (KSU-HE-18-138) and registered in the AEA RCT Registry (AEARCTR-0005114). The funding for this project was provided by a grant from the Harvard Kennedy School Evidence for Policy Design group and the Human Resources Development Fund of the Kingdom of Saudi Arabia. We thank seminar participants at Social Norms and Behaviour Change, Gender, Norms, and Economics Workshop, MENA Network of Experimental Social Scientists, UTS, and University of Pittsburgh. We thank Adeline Delavande, Alessandra Gonzalez, and Basit Zafar for helpful comments. We thank Sinaa Alaqeel and Yara Alsalman for their partnership and Luma Akkad, Noreen Mandora, Ali Vergili, and Aleksandra Erakthina for excellent research assistance.

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1 Introduction

People often conform to social norms or at least use norms as a reference point when making big and small decisions [Bicchieri, 2005]. Not surprisingly, "norm-nudging" has been commonly used to induce desired behavior [Bicchieri and Dimant, 2022, 2023]. If beliefs about the existing norms are wrong, then a simple information intervention correcting those beliefs could induce behavioral change. Studies have shown that information interventions correcting misperceptions can induce more positive attitudes towards immigrants, lower perceived public stigma with mental health problems, increase HIV testing, and encourage higher female labor force participation [Yu, 2023, Grigorieff et al., 2020, Turetsky and Sanderson, 2018, Bursztyn et al., 2020, Bursztyn and Yang, 2022]. It is common in the literature to focus on correcting one specific misperception that is potentially hindering the desired behavior. However, that behavior is likely tied to multiple interrelated beliefs. For example, a woman's decision to work outside the home may be related to beliefs about norms for women working in general but also beliefs about the effect of working mothers on children and family life. Changes in one of these interrelated beliefs could affect the others. Therefore, it is important to understand the spillover effects.

Our goal is to study the effect of an information treatment targeted at correcting a specific misperception on untargeted but closely related beliefs. Our context is female labor participation (FLP) in Saudi Arabia, which is ideal for two reasons. First, Saudi Arabia is a fast-changing society with multiple reforms implemented by the government in a short span of time.[1] The fast change in this country makes it more likely to observe misperceptions of social norms.[2] Secondly, there are likely multiple beliefs affecting FLP, such as the appropriateness of women working outside of the home or in mixed-gender work environments and the well-being of children and family life when the mother works.

In a study with Saudi married men, Bursztyn et al. [2020] found that they underestimated the share of peers who accept women working outside the home. Informing them of the true support increased their likelihood of supporting their wives working outside the home (e.g. increased sign-ups for job matching services, applications, and being interviewed for jobs). However, norms related to working women are not only limited to whether it is acceptable for women to work outside of the

[1] Saudi Arabia has undergone significant changes in various aspects of life due to educational, labor market, and social reforms. For instance, the enrollment rate in tertiary schools increased from 39% in 2010 to 74% in 2020. Additionally, there has been an increase in female labor participation from 17.4% in 2017 to 23.2% in 2019. The relaxation of gender segregation rules has also led to changes in several aspects of social and work life.

[2] United Arab Emirates, Qatar, and Oman are among the other countries that have undergone significant growth in female labor force participation between 2010 and 2019 according to the World Bank's World Development Indicators.

home but also involve balancing the demands of family life [Dhar et al., 2022, Jayachandran, 2021, Fernández, 2013, Goldin, 2006, Kleven et al., 2019, Kleven, 2022]. In fact, the norms related to family life play a crucial role in women's work decisions. For example, Kleven et al. [2019] and Kleven [2022] find a striking correlation between child penalties, e.g. the negative effect of children on labor market outcomes of women, and negative attitudes towards women working while having children under school age. Moreover, the norms about family life and gender roles in a household are strongly intertwined with the norms about women working outside of the home [Hamdan, 2005, Goldin, 2006]. For example, acceptance of women working outside of the home implies acceptance of women working towards a career. Working for a career usually requires more sacrifices in family life, e.g. less time for domestic work and delayed child-bearing, because of the long time horizons of employment as opposed to brief and intermittent employment in non-career jobs [Goldin, 2006]. As a result, when people are informed about the positive attitudes towards women working outside of the home or in mixed-gender environments, they are likely to update their beliefs on the effect of women working on family life and children.

We conducted a three-wave online survey experiment with both male and female students at a large public university in Saudi Arabia. In every wave, we asked participants to state their agreement with a subset of six statements related to women and mothers working. Some statements are only related to women's work irrespective of the motherhood role, such as "women should be allowed to work outside of the home." Others are related to the perceived effects of mothers working on children's well-being, such as "A preschool child is likely to suffer if his or her mother works." In addition to the participants' agreement with these statements, we also asked them to guess other students' opinions. We replicate the previous findings in the literature of underestimation of support for FLP inferred from statements that are not specifically related to motherhood [Bursztyn et al., 2020]. However, we find markedly different patterns on questions about the effects of FLP on family life and children. Specifically, the overwhelming majority of male and female students think that family life and a preschool child will suffer if women work. Moreover, students correctly guess this level of low support for FLP in relation to family life and childrens' well-being, especially of male students, as opposed to the underestimation found in two general statements.

Observing the underestimation for some of the questions, e.g. women working outside of the home, creates the opportunity to test the effect of an information treatment correcting these specific misperceptions on beliefs about other closely related norms, e.g. the wellbeing of children with working

mothers. In the last wave, we gave an information treatment to correct the misperceptions and tested the effect on other beliefs. We find that the information treatments, aimed at correcting the misperceptions of some specific norms, have either no effect or a negative effect on other related beliefs. We discuss self-serving belief distortion and cognitive dissonance as possible mechanisms for the spillover effect [Bicchieri et al., 2023].

2 Literature

There is a growing literature suggesting that expectations about marriage, children, and family life play an important role in human capital accumulation and labor force participation. Students sort into majors or invest in human capital based on their expectations of labor and marriage market returns, their expectations of having a family and children, and employment costs of motherhood [Wiswall and Zafar, 2021, Grewenig et al., 2020, Kuziemko et al., 2018]. Female college students expect a lower likelihood of working or working full time when they have young children [Gong et al., 2022, Cortés et al., 2022]. It is also well-known that social norms about family life and gender roles are important factors preventing women from achieving better outcomes in life and in the labor market [Dhar et al., 2022, Jayachandran, 2021, Miller et al., 2022, Eger et al., 2022, Cortés et al., 2022, Bertrand et al., 2021, Charles et al., 2022, Cortés and Pan, 2020, Antecol, 2000, Fernandez and Fogli, 2009, Ichino et al., 2022]. Social norms, defined as "behavioral rules supported by a combination of empirical and normative expectations" in Bicchieri et al. [2014], are powerful in shaping decisions in human capital accumulation and labor force participation [Dhar et al., 2022, Jayachandran, 2021, Bursztyn and Yang, 2022, Aloud et al., 2020, Kleven et al., 2019, Kleven, 2022, Jayachandran, 2015].

Sometimes, however, it is the misperception of social norms rather than the social norms themselves that create the barriers for women to participate in labor market [Bursztyn et al., 2023]. Bursztyn et al. [2020] finds that Saudi married men severely underestimate the societal acceptance of women working outside of the home or in mixed environments, and the recalibration of this misperception through information treatments helped to increase FLP. Similarly, in a study conducted with Saudi female university students, Aloud et al. [2020] looks at the effect of female peers' aspirations on female students' labor market expectations. This time, students underestimate the aspirations of their peers, and information about peers' aspirations increases students' expected future labor force participation.

Our study complements the previous studies in multiple ways and sheds further light on the recalibration of misperceptions. First, we confirm that people underestimate support for women working per

se; thus, the correction of such misperceptions may improve FLP. The replication of the earlier findings is especially valuable in the MENA (Middle East and North Africa) region, specifically in Saudi Arabia, which economists understudy despite its economic importance.[3] Second, asking questions related to other aspects of women working, e.g. job scarcity and family life, give us clues about the possible mechanisms underlying the underestimation of support. We observe that the underestimated attitudes are in the areas that the government directly targeted (e.g. women's employment) but not in the areas that are not targeted (e.g. gendered household roles). This suggests that the misperceptions are created due to stark changes in policy and possibly the failure of people to perceive the effect of this change on their social environments. Last, the previous studies show positive effects of information treatments aimed at re-calibrating misperceptions. However, we do not know how these information treatments affect other beliefs that are closely linked to the targeted beliefs, and are recognized to be crucial for women's participation in the labor market (e.g. gender norms around child-rearing). Our study seeks to understand the possible untargeted effects of misperception re-calibration. In a meta-analysis paper reviewing studies on misperceptions, Bursztyn and Yang [2022] find that the effects of information treatments on lagged outcomes are small although they are larger when measured just after the treatments. They discuss that one possible reason for this difference is the failure to change the underlying drivers of the behavior, even if a specifically targeted belief may change. This can happen when people start relying on a different set of beliefs to maintain their self-serving worldview. We contribute to this discussion in the literature by studying not only the targeted beliefs but also other related beliefs.

3 Survey

We conducted a series of three online surveys with students at King Saud University (KSU), located in Riyadh, Saudi Arabia. The university shared the recruitment email with all students on February 23, 2020. We sent the next two surveys to the students who participated in the first survey, on May 20, 2020 and October 13, 2020.

We presented the questions both in Arabic and English. Students received a 50 SAR (approximately 15 USD) electronic gift card, which can be used in several popular stores in Saudi Arabia for completing each survey which took about half an hour on average.[4]

[3] Saudi Arabia is the world's second-largest oil producer, the Middle East's largest economy, and one of the fastest-growing economies of the world.

[4] The social norms questions were part of this large survey.

3.1 Social Norms

To understand the views on women's participation in the labor force and gender roles, we elicited the participants' opinion and their second-order beliefs on three different statements. Specifically, each participant saw one of the two statements below.

- WW: "In my opinion, women should be allowed to work outside of the home"
- SEG: "In my opinion, a woman should have the right to work in semi-segregated environments."

We first asked participants whether they agree with the given statement. After that, we informed them about a previous study, explaining that in another study participants were recruited from different cities across Saudi Arabia to be a representative sample of all married males in Saudi Arabia aged 18-35, and asked them to guess what percentage of surveyed Saudi married males reported agreeing with the same statement and their confidence in their guess [Bursztyn et al., 2020]. We also asked them to guess what percentage of KSU male university students and what percentage of KSU female university students participating in our study reported agreeing with the same statement and their confidence in each of their guesses.

In addition to one of the statements listed above, we showed them two out of four statements below, which we gathered from the Global Social Survey of USA, the International Social Survey Program, or the World Values Survey.

- FAM: "All in all, family life suffers when the mother has a full-time job"
- CHILD: "A preschool child is likely to suffer if his or her mother works"
- WARM: "A working mother, who has a job outside home, can establish just as warm and secure a relationship with her children as a mother who does not work"
- MJP: "When jobs are scarce, men should have more right to a job than women."

We then asked students to guess what percentage of KSU male university students and KSU female university students participating in our study reported agreeing with the same statements and their confidence in each.

We incentivized all guesses from all three questions. We rewarded the student who guessed most accurately across all questions with an additional 50 SAR gift card. The students answered the same set of social norm questions that they saw in the first wave of the survey in the subsequent two waves.

To better understand the role of family life and child-rearing norms, we showed additional statements to all participants in the last wave. In these statements, we aim to understand whether students form more positive opinions for FLP if there are family-friendly policies in place by asking the FAM and CHILD questions in a family-friendly context. As we did in the previous statements, we first asked students their agreement with these statements, their guesses on male and female university students' opinions on the same questions, and their confidence in these guesses.

- FAMFFC: Do you agree with the following statement if there are high-quality daycare options or if grandparents/extended family can take care of the child? "All in all, family life suffers when the mother has a full time job"
- CHILDFFC: Do you agree with the following statement if there are high-quality daycare options or if grandparents/extended family can take care of the child? "A preschool child is likely to suffer if his or her mother works."

3.2 Information Treatment

In the third wave of our study, after eliciting the first and second-order beliefs on the WW or SEG statement, we provided the treatment group bar charts showing the share of male and female university students who agreed with the statement in the first survey (see Figure 12 in the Appendix). After seeing this information, they answered the additional social norm questions as in the first two surveys.

3.3 Labor Market Expectations and Willingness to Pay for Labor Market Support

In every wave, we asked students their beliefs related to labor market outcomes. These include the likelihood of working, of working full time, and of working in the private sector, at the age of 25 and 30. Additionally, we asked them their likelihood of applying "for jobs before graduation or within 6 months of graduation" and the likelihood of being employed "within one year of graduation". Finally, we measured their willingness to pay for a professional CV writing service (with a value of around 250SAR), which would be implemented for 1% of participants. Specifically, we asked students to choose between "Professional CV writing" and an additional amount on their gift card starting with 20SAR up to 90SAR in eight binary choices.

4 Results

4.1 Summary Statistics

The average age of the participants is 21.16 and 42% are female. A small minority are married (5%) and have children (3%). The majority of the participants are Saudi (85%). Participants' parents are highly educated, with 58% of fathers and 47% of mothers having at least a Bachelor's degree. Nearly half of the students (47%) report that their mothers have worked for pay (See Table 1).

When we look at academic outcomes, the average GPA is 4.02 out 5.00 and the expected graduation date is 2023 or later for almost half of the participants (47%). The share of students who expect to graduate in earlier years of 2020, 2021, and 2022 are 15%, 21%, and 17% respectively. Among all, 14% in Business, 14% in Health, 38% in Humanities, and 34% in Science tracks. According to the statistics we received from the university, the actual share of students in Business+Humanities, Health, and Science tracks is very close to the share of students in these tracks in our sample.[5] Specifically, in our sample, 46% of males and 61% of females are majoring in Business+Humanities and these numbers are very close to 43% and 61% at the university. Similarly, in our sample 15% (39%) of males and 13%(27%) of females are on the Health (Science) track, which is similar to the share of males, 14%(43%), and females, 14% (25%), on Health (Science) tracks at the university. 86% of students are studying for Bachelor's, 6% for Masters, 2% for PhD, and 7% for other degrees.

[5]The percentage for Business and Humanities was presented by the university as a single aggregate figure.

	All mean/sd	Male mean/sd	Female mean/sd
Female	0.42	0.00	1.00
	(0.49)	(0.00)	(0.00)
Age	21.16	21.24	21.03
	(3.06)	(3.00)	(3.14)
Married	0.05	0.04	0.07
	(0.22)	(0.20)	(0.25)
HaveChildren	0.03	0.03	0.04
	(0.18)	(0.18)	(0.18)
Saudi	0.85	0.83	0.86
	(0.36)	(0.37)	(0.34)
FatherBA	0.58	0.61	0.54
	(0.49)	(0.49)	(0.50)
MotherBA	0.47	0.45	0.50
	(0.50)	(0.50)	(0.50)
MotherEverWorked	0.47	0.46	0.49
	(0.50)	(0.50)	(0.50)
GPA	4.02	3.92	4.16
	(0.89)	(0.79)	(1.00)
Expg2020	0.15	0.17	0.14
	(0.36)	(0.37)	(0.34)
Expg2021	0.21	0.19	0.25
	(0.41)	(0.39)	(0.43)
Expg2022	0.17	0.18	0.16
	(0.37)	(0.38)	(0.36)
Expg2023	0.47	0.47	0.46
	(0.50)	(0.50)	(0.50)
Business	0.14	0.14	0.14
	(0.35)	(0.35)	(0.34)
Health	0.14	0.15	0.13
	(0.35)	(0.36)	(0.33)
Humanities	0.38	0.32	0.47
	(0.49)	(0.47)	(0.50)
Science	0.34	0.39	0.27
	(0.47)	(0.49)	(0.45)
Bachelor	0.86	0.91	0.77
	(0.35)	(0.28)	(0.42)
Master	0.06	0.05	0.08
	(0.24)	(0.21)	(0.27)
PhD	0.02	0.01	0.02
	(0.13)	(0.12)	(0.14)
Other	0.07	0.03	0.13
	(0.25)	(0.16)	(0.33)
N	477	278	199

Table 1: Summary Statistics

4.2 Own opinions

We report the attitudes toward FLP inferred from the answers to all questions asked in the first survey.[6] Figure 1 shows the bar graph of own opinions, coded in an FLP positive way, on each question by gender. Specifically, if the question is asking for agreement on an FLP negative statement, such as "All in all, family life suffers when the mother has a full-time job", we coded the agreement with this statement as 0 and disagreement as 1. There are a number of observations to make on this graph. First, the attitudes towards FLP inferred from the FAM and CHILD questions are the most negative, which is true for both male and female students but more pronounced for male students. Specifically, only 14%(23%) and 24%(35%) of male(female) students answer in an FLP+ way in the FAM and CHILD questions. In WARM and MJP questions, male (female) students answer in a FLP+ way at 55%(76%) and 41%(69%) of the time. Despite the low FLP+ attitudes inferred from the FAM and CHILD questions and the lukewarm FLP+ answers from the WARM and MJP questions, the positive attitudes inferred from the WW and SEG questions are striking and similar to previous findings in Bursztyn et al. [2020]. Our results for the WW question are also in line with answers to a similar question asked in the 2010-2011 wave of the Arab Barometer survey conducted using a nationally representative sample in Saudi Arabia. Moreover, the opinion on WW question is positively correlated with answers on the FAM, CHILD, WARM, and MJP questions, indicating that these are closely related beliefs.

[6] Data from the other waves is similar and the attitudes do not fluctuate much over three waves (See Figure 3 and 4 in the Appendix).

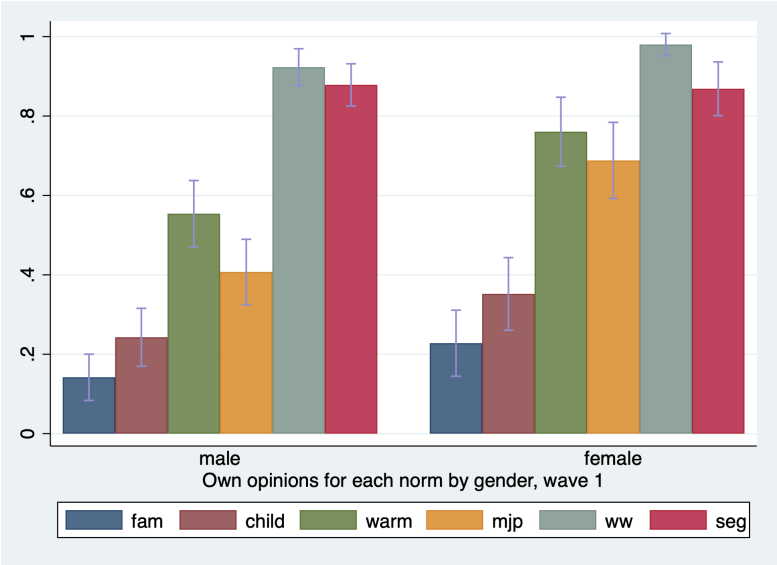

Figure 1: Own Opinions for each norm by gender, wave 1
Notes: Percentages of participants who provided an FLP+ answer for each of the six social norm questions with confidence intervals

4.3 Perceptions

From the students' guesses about other students' opinions, we can measure whether they hold correct perceptions of others. Following the criteria set forth in Bursztyn and Yang [2022], we investigate misperceptions in two ways. First, we consider the perceptions to be accurate if they are within 0.5 standard deviation (SD) of the truth, taking the average of students' own opinions as the truth. Misperceptions of male students' viewpoints are particularly pronounced in MJP, WW, and SEG statements, but to a lesser extent in FAM, CHILD, and WARM statements. On the other hand, there is no apparent pattern suggesting that females are more commonly misunderstood in specific statements (Refer to Figures 5-7 in the Appendix to see the details about the percentage of accurate guesses regarding male and female students' opinions on the six questions in each wave. Additionally, Figures 8 and 9 display the breakdown of accuracy based on the gender of the guesser specifically in the first wave.)

Second, we investigate the nature of these misperceptions in Figure 2, which shows the percentages of overestimations among the inaccurate guesses when guessing male (left hand side graph) and female (right hand side graph) opinions (e.g. the guesses which are further away from the 0.5 SD of the truth). In these graphs, the horizontal red line indicates misperceptions on either side of the truth to be equal, therefore implying unsystematic deviations from the truth. In both graphs, bars for WW

and SEG are not visible, meaning that all misperceptions are underestimations, irrespective of the gender that students are guessing. The bar for MJP, on the other hand, is very small only when guessing male opinions consistently in every wave, showing that most of the misperceptions in MJP are underestimations.[7] On the contrary, the misperceptions on FAM and CHILD questions are largely overestimations. There is no clear systematic pattern on misperceptions in the WARM question.

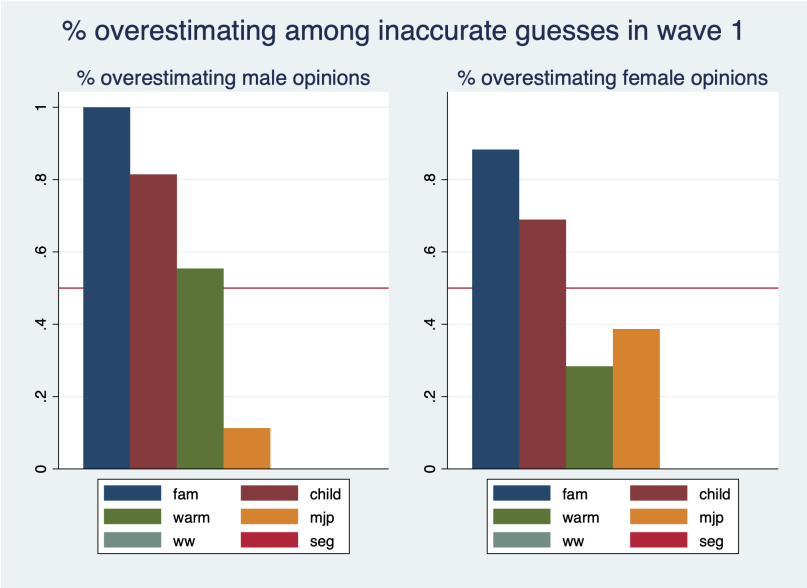

Figure 2: Asymmetry in perceptions, wave 1
Notes: The percentages of overestimation among the inaccurate guesses when guessing male (left) and female (right) opinions in the first wave for each of the six social norm questions.

4.4 Information Treatment and Spillover Effects

To understand the effect of correcting a particular misperception, e.g. WW and SEG, on other beliefs relevant to FLP, e.g. FAM, CHILD, WARM, and MJP, we gave an information treatment in the last wave to half of our sample. Specifically, we informed half of the students in the last wave about the correct percentage of male and female students who gave positive answers to the WW (or SEG) statement asked in the first wave. The randomization was successful giving us a balanced sample (See Table 4 for the details).

First, we examined the students' own opinions and find no treatment effects (See Table 5 in the Appendix for details). Second, we look at the perceptions of male and female students' beliefs in Table 2. The treatment has a surprising negative effect on students' perception of other students' beliefs

[7]Figures 10 and 11 in the Appendix show the asymmetry of misperceptions over three waves when guessing male and female students' opinions separately.

regarding the CHILD question.[8] In other words, the information treatment causes to update towards a larger share of male and female university students agreeing with the statement "*A preschool child is likely to suffer if his or her mother works.*" The negative effect on second-order beliefs about male opinions is robust.[9] We find that this negative effect is solely driven by the guesses made by male students (See Tables 6 and 7 showing the results by gender in the Appendix).

		control (%)	N1	treatment (%)	N2	p-value
guessing male students	fam	20.02	125	20.93	117	.710
	child	28.55	126	21.06	118	.002
	warm	63.01	119	68.79	116	.044
	mjp	19.73	120	21.40	113	.596
guessing female students	fam	34.83	125	36.54	117	.615
	child	39.41	126	33.13	118	.034
	warm	79.40	119	78.06	116	.596
	mjp	55.60	120	52.56	113	.454
N	477					

Table 2: Treatment effect on perceptions

4.5 Information Treatment and (Expected) Labor Market Outcomes

We look at the treatment effect on expected labor market outcomes. Table 3 shows the students' beliefs about likelihood of working at 25(30), working full-time at 25(30), working in a private sector at 25(30), and the likelihood of applying for jobs and being employed within one year of graduation. There is no strong treatment effect on any of these expected outcome measures. We also found no difference between the control and treatment groups in willingness to pay for professional CV writing (t-test, p=0.438).

[8] The critical value is 0.004 with Bonferroni correction for multiple comparisons.
[9] See Table 9 in the Appendix for the diff-in-diff analysis using our panel data

	control	N1	treatment	N2	p-value
work25	82.78	245	80.88	232	0.348
work25_ft	81.36	245	81.67	232	0.880
work25_pri	72.44	245	73.25	232	0.692
work30	87.49	245	84.50	232	0.097
work30_ft	85.72	245	83.54	232	0.246
work30_pri	68.51	245	69.56	232	0.624
lkemp	72.80	245	75.62	232	0.171
lkapp	80.91	245	80.61	232	0.896
N	477				

Table 3: Treatment effect on (expected) labor market outcomes

Although we found very similar results to Bursztyn et al. [2020] on the underestimation of the support for FLP inferred from the WW and SEG questions, the information treatment does not affect the expected outcomes in our sample. There are a number of possible explanations for the divergent findings. Firstly, 65% of the wives in the married males sample of Bursztyn et al. [2020] were already working but only 8% were working outside of the home. Moreover, 75% of their sample have children. This suggests that the wives of the married males sample were probably not held back from working for family reasons, but because of the misperception of social norms about working outside of the home or in mixed-gender environments. Secondly, the students in our sample were given questions not only about the acceptability of women working outside of the home or in mixed-gender settings but also about the effect of women working on family life. Therefore, it is possible that family and childcare concerns are more likely to be salient in the decision-making process in our sample compared to theirs [Cortés et al., 2022]. It is well-known in the literature that students' expectations of family life affect their human capital accumulation and labor market decisions [Wiswall and Zafar, 2021, Aloud et al., 2020, Gong et al., 2022]. Given the low support for FLP inferred from the family-life questions, it is likely that family and childcare concerns swamp the possible positive effect of changing misperceptions about the acceptability of women working outside of home. This explanation is consistent with the fact that the positive effect of the information treatment in the Bursztyn et al. [2020] sample was mainly driven by the participants who do not have children.

5 Mechanisms

5.1 Self-serving Belief Distortion

There is a large literature on motivated beliefs establishing that beliefs directly affect well-being [Dana et al., 2007, Bicchieri and Xiao, 2009, Bicchieri and Chavez, 2013, Bénabou, 2015, Bénabou and Tirole, 2016, Bicchieri et al., 2023, Gino et al., 2016, Babcock and Loewenstein, 1997]. For example, people hold some beliefs either to make the future seem bright (*affective motivation*) or to achieve some future goal (*functional motivation*). They can hold on to these motivated beliefs by strategically manipulating inferences from the information received (self-serving belief distortion).

In our setting, we observe that male students distort their perception of society in a way that makes the labor market possibly more promising in the treatment group (e.g. competition will not increase much due to female labor market participation since most will not enter (or will not stay long) in the labor market to care for their children). However, we do not observe this effect for male students exposed to similar questions in a family-friendly context. This is consistent with self-serving belief distortion because the family-friendly context leaves less wiggle room to distort beliefs in a self-serving way [Kunda, 1990, Saccardo and Serra-Garcia, 2023].

More importantly, we do not observe the negative spillover effect of the treatment for female students in our data, which is again consistent with self-serving belief distortion. Because this type of belief distortion would not help female students to hold similar optimistic beliefs about labour market outcomes.

5.2 Cognitive Dissonance

Suppose someone believes in general that society is largely opposed to women participating in the labor market. This view may be due to several more specific (mis)perceptions. For example, this person may incorrectly believe that society is not accepting of women working outside of the home or in mixed-gender environments, as in the case of the population we study. Or, this person may believe that society thinks that family life and children will suffer if the mother works. In this case, even when an information treatment can correct the misperceptions in one specific area, e.g. women working outside of the home, it is possible that the person may start relying on a different set of beliefs in another area, e.g. family life, to hold on to their general negative beliefs on society's attitude towards FLP so that they can avoid cognitive dissonance [Bursztyn and Yang, 2022, Bicchieri and

Chavez, 2013, Frey and Meier, 2004]. While the male students' perception, specifically a decrease in second-order beliefs for the CHILD question, aligns with this mechanism, the lack of a similar pattern in female students contradicts the cognitive dissonance explanation because there is no clear reason for cognitive dissonance to occur exclusively in males.

6 Conclusion

We studied the effect of correcting one misperceived norm on beliefs about related social norms in the context of a society with strong gender norms facing fast and stark changes in government policy that potentially affect these norms. First, using a sample of male and female university students in a large Saudi Arabian public university, we replicated the previous finding that Saudi men underestimate the support other Saudi men have for women working outside of the home and in mixed-gender environments [Bursztyn et al., 2020] and find that this result extends to Saudi women as well. Second, we provide evidence for the importance of norms about family life and children on women's work decisions. The majority of male and female students believe that family life and children will suffer when the mother works suggesting that these strong gender norms about household roles are the bottleneck holding back female labor force participation. In contrast to the underestimation of the positive norms for women working outside the home or in mixed-gender environments, we find that students perceive the norms about family life and children correctly and that they are sometimes even too optimistic. Finally, we test the effect of an information treatment that corrects the underestimation of one norm, e.g. women should be allowed to work outside of the home, on untargeted but closely related norms and their perception, e.g. children will suffer when their mother works. We find that the information treatment does not move some of the related norms or perceptions thereof and can actually move them in the opposing direction. More research is needed to investigate the unintended consequences of information treatments on untargeted but relevant norms and their perception since information treatments are often used as a policy nudge to achieve desirable outcomes.

References

M. E. Aloud, S. Al-Rashood, I. Ganguli, and B. Zafar. Information and social norms: Experimental evidence on the labor market aspirations of saudi women, 1 2020. URL http://www.nber.org/papers/w26693.pdf.

H. Antecol. An examination of cross-country differences in the gender gap in labor force participation rates. *Labour Economics*, 7:409–426, 7 2000. ISSN 0927-5371. doi: 10.1016/S0927-5371(00)00007-5.

L. Babcock and G. Loewenstein. Explaining bargaining impasse: The role of self-serving biases. *Journal of Economic Perspectives*, 11:109–126, 1997. ISSN 0895-3309. doi: 10.1257/JEP.11.1.109.

M. Bertrand, P. Cortes, C. Olivetti, and J. Pan. Social norms, labour market opportunities, and the marriage gap between skilled and unskilled women. *The Review of Economic Studies*, 88:1936–1978, 7 2021. ISSN 0034-6527. doi: 10.1093/restud/rdaa066. URL https://academic.oup.com/restud/article/88/4/1936/6025100.

C. Bicchieri. *The Grammar of Society*. Cambridge University Press, 12 2005. ISBN 9780521574907. doi: 10.1017/CBO9780511616037. URL https://www.cambridge.org/core/product/identifier/9780511616037/type/book.

C. Bicchieri and A. K. Chavez. Norm manipulation, norm evasion: Experimental evidence. *Economics and Philosophy*, 29:175–198, 7 2013. ISSN 0266-2671. doi: 10.1017/S0266267113000187. URL https://www.cambridge.org/core/product/identifier/S0266267113000187/type/journal_article.

C. Bicchieri and E. Dimant. Nudging with care: the risks and benefits of social information. *Public Choice*, 191:443–464, 6 2022. ISSN 15737101. doi: 10.1007/S11127-019-00684-6/FIGURES/6. URL https://link.springer.com/article/10.1007/s11127-019-00684-6.

C. Bicchieri and E. Dimant. Norm-nudging: Harnessing social expectations for behavior change. *SSRN Electronic Journal*, 2023. ISSN 1556-5068. doi: 10.2139/ssrn.4418351. URL https://www.ssrn.com/abstract=4418351.

C. Bicchieri and E. Xiao. Do the right thing: But only if others do so. *Journal of Behavioral Decision Making*, 22:191–208, 2009. ISSN 10990771. doi: 10.1002/BDM.621.

C. Bicchieri, H. M. T. complexity of social norms, and undefined 2014. Norms and beliefs: How change occurs. *Springer*, pages 37–54, 2014. doi: 10.1007/978-3-319-05308-0_3. URL https://link.springer.com/chapter/10.1007/978-3-319-05308-0_3.

C. Bicchieri, E. Dimant, and S. Sonderegger. It's not a lie if you believe the norm does not apply: Conditional norm-following and belief distortion. *Games and Economic Behavior*, 138:321–354, 3 2023. ISSN 08998256. doi: 10.1016/j.geb.2023.01.005. URL https://linkinghub.elsevier.com/retrieve/pii/S0899825623000088.

L. Bursztyn and D. Y. Yang. Misperceptions about others. *Annual Review of Economics*, 14:425–452, 8 2022. ISSN 1941-1383. doi: 10.1146/annurev-economics-051520-023322. URL https://www.annualreviews.org/doi/10.1146/annurev-economics-051520-023322.

L. Bursztyn, A. L. González, and D. Yanagizawa-Drott. Misperceived social norms: women working outside the home in saudi arabia. *American Economic Review*, 110:2997–3029, 10 2020. ISSN 19447981. doi: 10.1257/aer.20180975.

L. Bursztyn, A. Cappelen, B. Tungodden, and A. Voena. How are gender norms perceived? 2023. URL https://www.nber.org/papers/w31049.

R. Bénabou. The economics of motivated beliefs. *Revue d'économie politique*, Vol. 125, 2015. ISSN 0373-2630. doi: 10.3917/redp.255.0665.

R. Bénabou and J. Tirole. Mindful economics: The production, consumption, and value of beliefs. volume 30, 2016. doi: 10.1257/jep.30.3.141.

K. K. Charles, J. Guryan, and J. Pan. The effects of sexism on american women: The role of norms vs. discrimination. *Journal of Human Resources*, pages 0920–11209R3, 11 2022. ISSN 0022-166X. doi: 10.3368/jhr.0920-11209R3. URL http://jhr.uwpress.org/lookup/doi/10.3368/jhr.0920-11209R3.

P. Cortés and J. Pan. Children and the remaining gender gaps in the labor market, 10 2020. URL http://www.nber.org/papers/w27980.pdf.

P. Cortés, G. Koşar, J. Pan, and B. Zafar. Should mothers work? how perceptions of the social norm affect individual attitudes toward work in the u.s., 10 2022. URL http://www.nber.org/papers/w30606.pdf.

J. Dana, R. A. Weber, and J. X. Kuang. Exploiting moral wiggle room: experiments demonstrating an illusory preference for fairness. *Economic Theory*, 33:67–80, 7 2007. ISSN 0938-2259. doi: 10.1007/s00199-006-0153-z. URL http://link.springer.com/10.1007/s00199-006-0153-z.

D. Dhar, T. Jain, and S. Jayachandran. Reshaping adolescents' gender attitudes: Evidence from a school-based experiment in india. *American Economic Review*, 112:899–927, 3 2022. ISSN 19447981. doi: 10.1257/AER.20201112.

C. Eger, T. Fetzer, J. Peck, and S. Alodayni. Organizational, economic or cultural? firm-side barriers to employing women in saudi arabia. *World Development*, 160:106058, 12 2022. ISSN 0305750X. doi: 10.1016/j.worlddev.2022.106058. URL https://linkinghub.elsevier.com/retrieve/pii/S0305750X22002480.

R. Fernandez and A. Fogli. Culture: An empirical investigation of beliefs, work, and fertility. *American Economic Journal: Macroeconomics*, 1, 2009. ISSN 19457715. doi: 10.1257/mac.1.1.146.

R. Fernández. Cultural change as learning: The evolution of female labor force participation over a century. *American Economic Review*, 103:472–500, 2 2013. ISSN 0002-8282. doi: 10.1257/aer.103.1.472. URL https://pubs.aeaweb.org/doi/10.1257/aer.103.1.472.

B. S. Frey and S. Meier. Social comparisons and pro-social behavior: Testing conditional cooperation in a field experiment. *American Economic Review*, 94:1717–1722, 12 2004. ISSN 00028282. doi: 10.1257/0002828043052187.

F. Gino, M. I. Norton, and R. A. Weber. Motivated bayesians: Feeling moral while acting egoistically. *Journal of Economic Perspectives*, 30:189–212, 8 2016. ISSN 0895-3309. doi: 10.1257/jep.30.3.189. URL https://pubs.aeaweb.org/doi/10.1257/jep.30.3.189.

C. Goldin. The quiet revolution that transformed women's employment, education, and family. volume 96, pages 1–21, 5 2006. doi: 10.1257/000282806777212350.

Y. Gong, R. Stinebrickner, and T. Stinebrickner. Marriage, children, and labor supply: Beliefs and outcomes. *Journal of Econometrics*, 231:148–164, 11 2022. ISSN 03044076. doi: 10.1016/j.jeconom.2020.03.023. URL https://linkinghub.elsevier.com/retrieve/pii/S0304407620302803.

E. Grewenig, P. Lergetporer, and K. Werner. Gender norms and labor-supply expectations: Experimental evidence from adolescents. *SSRN Electronic Journal*, 2020. ISSN 1556-5068. doi: 10.2139/ssrn.3711887. URL https://www.ssrn.com/abstract=3711887.

A. Grigorieff, C. Roth, and D. Ubfal. Does information change attitudes toward immigrants? *Demography*, 57:1117–1143, 6 2020. ISSN 0070-3370. doi: 10.1007/s13524-020-00882-8. URL https://read.dukeupress.edu/demography/article/57/3/1117/168019/Does-Information-Change-Attitudes-Toward.

A. Hamdan. Women and education in saudi arabia: Challenges and achievements. *International Education Journal*, 6:42–64, 2005. ISSN 1443-1475. URL https://eric.ed.gov/?id=EJ854954.

A. Ichino, M. Olsson, B. Petrongolo, and P. Thoursie. Taxes, childcare, and gender identity norms. 2022. URL http://www.andreaichino.it/wp-content/uploads/2019/05/gender_identity.pdf.

S. Jayachandran. The roots of gender inequality in developing countries. *Annual Review of Economics*, 7, 2015. ISSN 19411391. doi: 10.1146/annurev-economics-080614-115404.

S. Jayachandran. Social norms as a barrier to women's employment in developing countries. *IMF Economic Review*, 69:576–595, 9 2021. ISSN 2041-4161. doi: 10.1057/s41308-021-00140-w. URL https://link.springer.com/10.1057/s41308-021-00140-w.

H. Kleven. The geography of child penalties and gender norms: Evidence from the united states. *SSRN Electronic Journal*, 2022. ISSN 1556-5068. doi: 10.2139/ssrn.4171445. URL https://www.ssrn.com/abstract=4171445.

H. Kleven, C. Landais, J. Posch, A. Steinhauer, and J. Zweimüller. Child penalties across countries: Evidence and explanations. *AEA Papers and Proceedings*, 109:122–126, 5 2019. ISSN 2574-0768. doi: 10.1257/PANDP.20191078.

Z. Kunda. The case for motivated reasoning. *Psychological Bulletin*, 108:480–498, 1990. ISSN 1939-1455. doi: 10.1037/0033-2909.108.3.480. URL http://doi.apa.org/getdoi.cfm?doi=10.1037/0033-2909.108.3.480.

I. Kuziemko, J. Pan, J. Shen, and E. Washington. The mommy effect: Do women anticipate the employment effects of motherhood?, 6 2018. URL http://www.nber.org/papers/w24740.pdf.

C. Miller, J. Peck, and M. Seflek. Missing women, integration costs, and big push policies in the saudi labor market. *American Economic Journal: Applied Economics*, 14:51–77, 4 2022. ISSN 1945-7782. doi: 10.1257/app.20200220. URL https://pubs.aeaweb.org/doi/10.1257/app.20200220.

S. Saccardo and M. Serra-Garcia. Enabling or limiting cognitive flexibility? evidence of demand for moral commitment. *American Economic Review*, 113:396–429, 2 2023. ISSN 0002-8282. doi: 10.1257/AER.20201333. URL https://pubs.aeaweb.org/doi/10.1257/aer.20201333.

K. M. Turetsky and C. A. Sanderson. Comparing educational interventions: Correcting misperceived norms improves college students' mental health attitudes. *Journal of Applied Social Psychology*, 48: 46–55, 1 2018. ISSN 00219029. doi: 10.1111/jasp.12489. URL https://onlinelibrary.wiley.com/doi/10.1111/jasp.12489.

M. Wiswall and B. Zafar. Human capital investments and expectations about career and family. *Journal of Political Economy*, 2021. ISSN 1537534X. doi: 10.1086/713100.

H. Yu. Social stigma as a barrier to hiv testing: Evidence from a randomized experiment in mozambique. *Journal of Development Economics*, 161:103035, 3 2023. ISSN 03043878. doi: 10.1016/j.jdeveco.2022.103035. URL https://linkinghub.elsevier.com/retrieve/pii/S0304387822001778.

7 Online Appendix

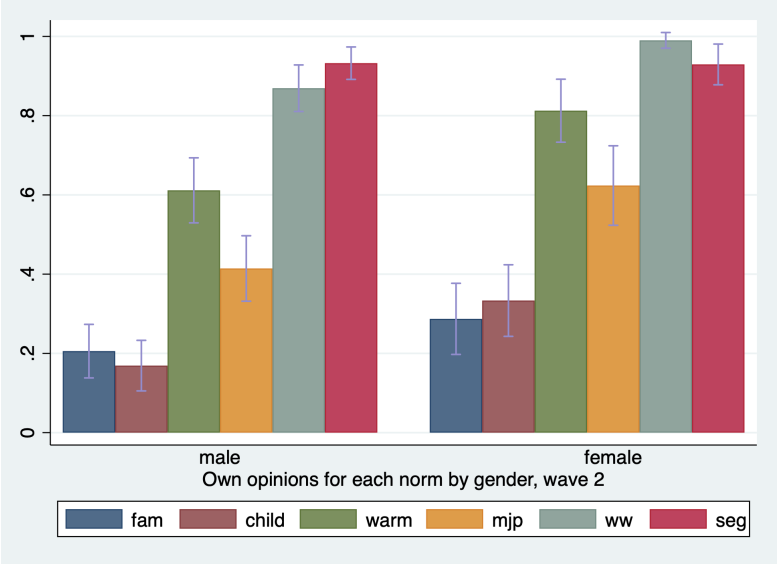

Figure 3: Own Opinions for each norm by gender, wave 2

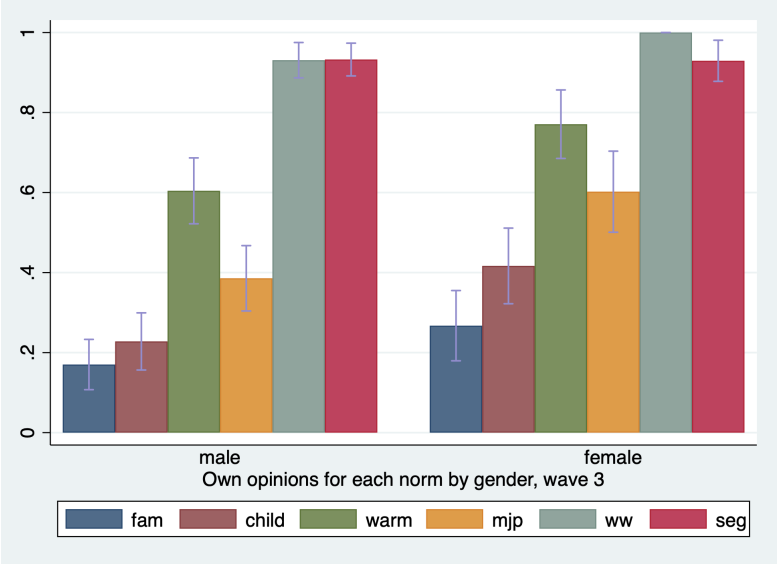

Figure 4: Own Opinions for each norm by gender, wave 3

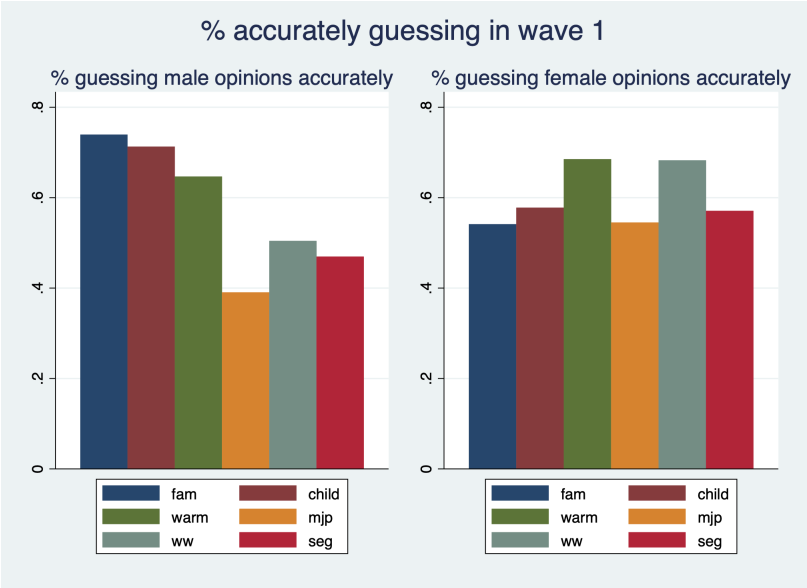

Figure 5: % guessing accurately in wave 1

Notes: Percentage of participants guessing the actual opinions of male (left) and female (right) students in the first wave for each of the six social norms questions The left-hand side graph shows that male students' opinions are especially misperceived in MJP, WW, and SEG questions, but less so in FAM, CHILD, and WARM questions. The right-hand side graph shows that female students' opinions are misperceived less than 50% of the time across questions, and there is no clear pattern.

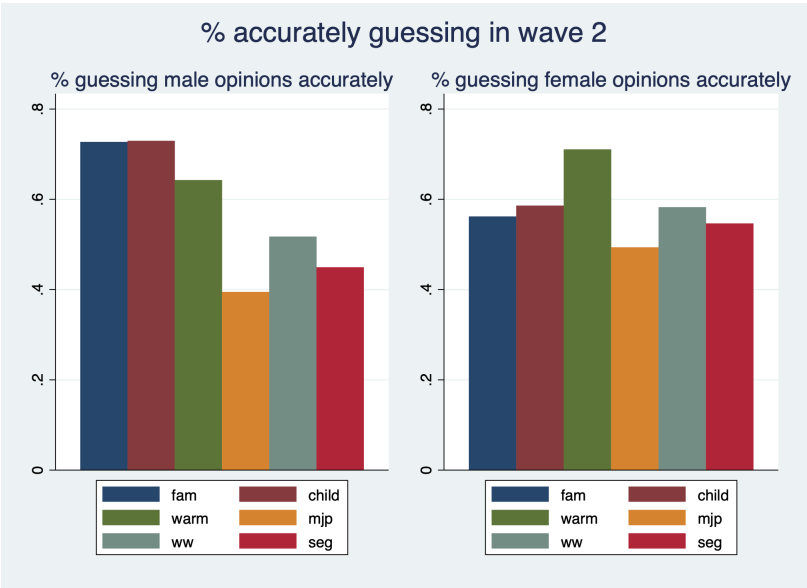

Figure 6: % guessing accurately in wave 2

Notes: Percentage of participants guessing the actual opinions of male (left) and female (right) students in the second wave for each of the six social norms questions

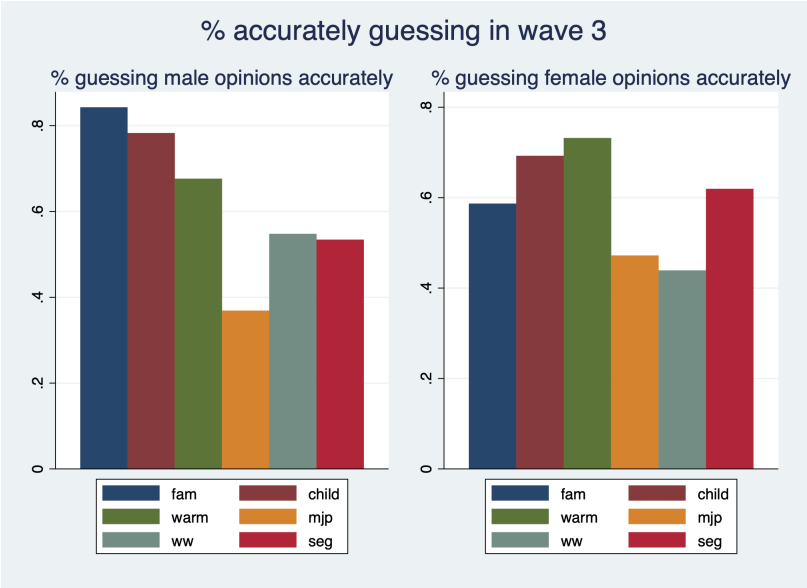

Figure 7: % guessing accurately in wave 3
Notes: Percentage of participants guessing the actual opinions of male (left) and female (right) students in the third wave for each of the six social norms questions

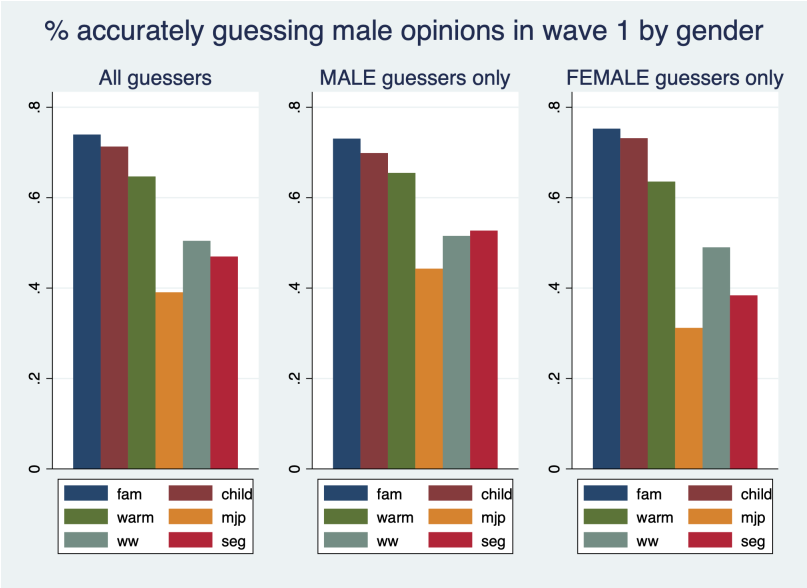

Figure 8: % guessing male opinions accurately in wave 1 by gender

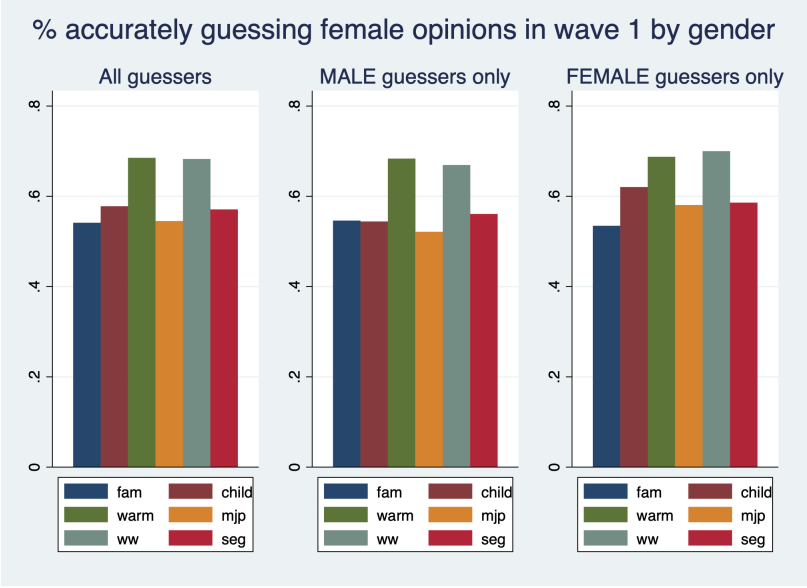

Figure 9: % guessing female opinions accurately in wave 1 by gender

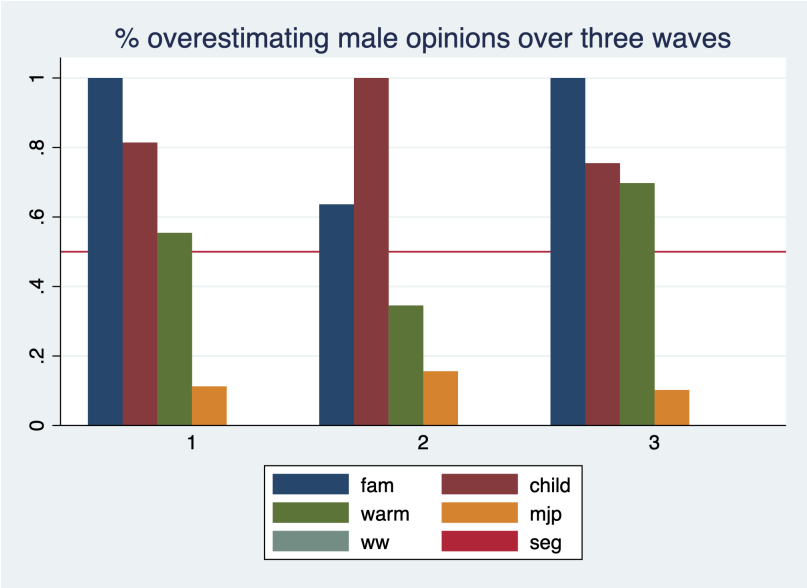

Figure 10: Asymmetry in perceptions when guessing male university students' opinions over three waves

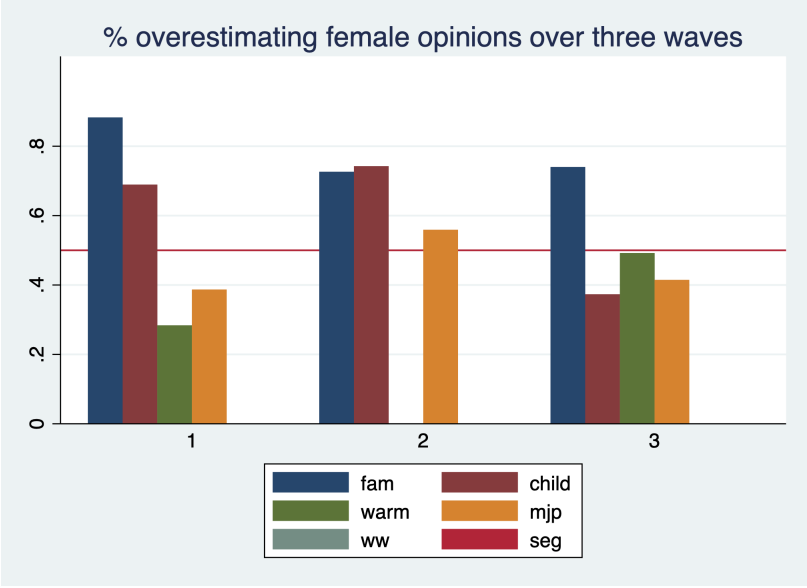

Figure 11: Asymmetry in perceptions when guessing female university students' opinions over three waves

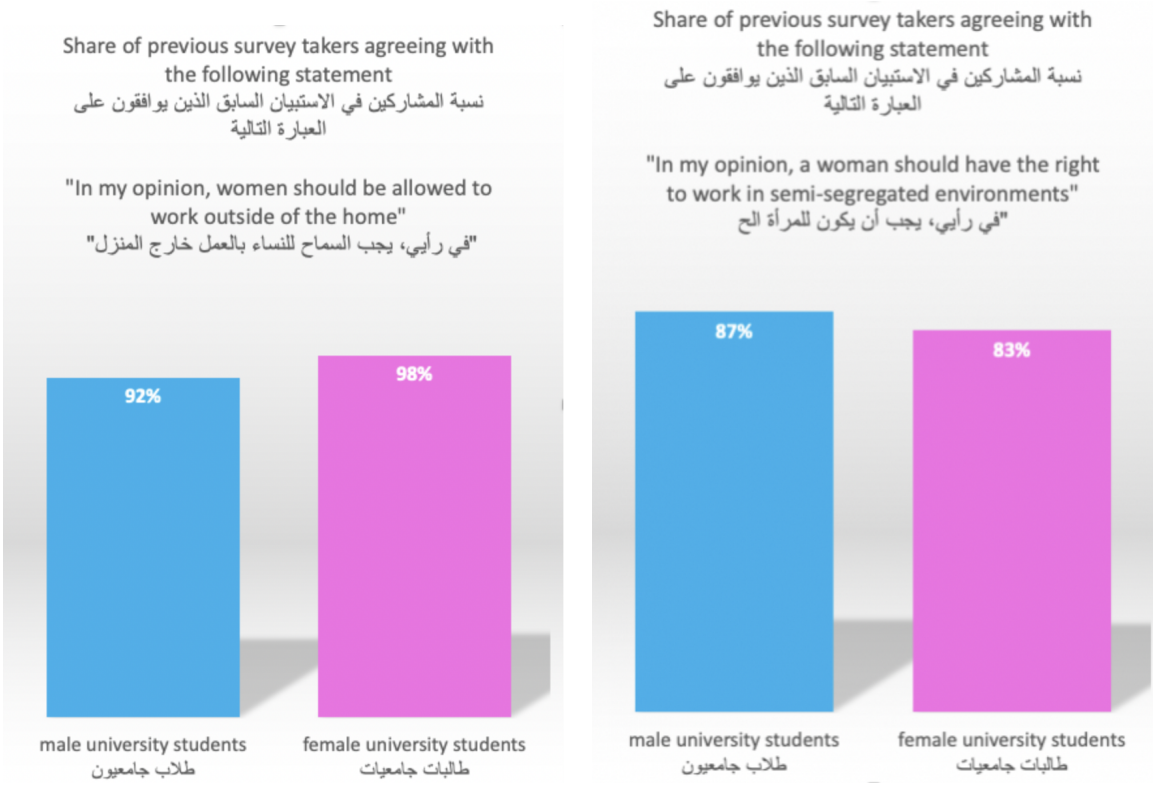

Figure 12: Information Treatments

	control	N1	treatment	N2	p-value
Female	0.40	245	0.43	232	0.551
Age	21.40	245	20.90	232	0.073
Married	0.07	245	0.03	232	0.034
HaveChildren	0.05	245	0.02	232	0.054
Saudi	0.85	245	0.84	232	0.704
FatherBA	0.57	215	0.58	200	0.790
MotherBA	0.44	215	0.51	200	0.167
MotherEverWorked	0.47	215	0.46	200	0.769
Expg2020	0.15	245	0.16	232	0.704
Expg2021	0.23	245	0.19	232	0.355
Expg2022	0.16	245	0.18	232	0.449
Expg2023	0.47	245	0.47	232	0.933
Business	0.13	245	0.15	232	0.709
Humanities	0.37	245	0.39	232	0.640
Health	0.13	245	0.15	232	0.614
Science	0.36	245	0.31	232	0.263
Bachelor	0.85	245	0.86	232	0.884
Master	0.08	245	0.04	232	0.116
PhD	0.02	245	0.01	232	0.177
Other	0.04	245	0.09	232	0.047
N	477				

Table 4: Balance Check

	control (%)	N1	treatment (%)	N2	p-value
fam	20.00	125	22.22	117	.672
child	34.13	126	27.97	118	.299
warm	69.75	119	64.66	116	.406
mjp	46.67	120	47.79	113	.864
N	477				

Table 5: Treatment effect on own opinions

		control	N1	treatment	N2	p-value
guessing male students	fam	20.88	73	21.13	68	0.934
	child	29.79	72	19.98	64	0.003
	warm	67.92	73	72.73	66	0.176
	mjp	20.54	74	23.94	66	0.391
guessing female students	fam	37.49	73	38.38	68	0.845
	child	39.79	72	31.64	64	0.043
	warm	77.86	73	77.32	66	0.885
	mjp	57.74	74	55.88	66	0.732
N	278					

Table 6: Treatment Effect on Perceptions, males only

	control	N1	treatment	N2	p-value	
guessing male students	fam	18.81	52	20.65	49	0.649
	child	26.89	54	22.33	54	0.216
	warm	55.22	46	63.60	50	0.065
	mjp	18.43	46	17.83	47	0.907
guessing female students	fam	31.10	52	33.98	49	0.571
	child	38.91	54	34.89	54	0.361
	warm	81.85	46	79.04	50	0.349
	mjp	52.15	46	47.89	47	0.481
N	199					

Table 7: Treatment Effect on Perceptions, females only

	(1) ww	(2) seg	(3) fam	(4) child	(5) warm	(6) mjp
ATET						
	-0.00915	-0.0291	-0.0371	-0.0135	-0.0807	0.0365
	(-0.32)	(-0.87)	(-0.72)	(-0.24)	(-1.51)	(0.75)
Controls						
Wave2	-0.0261	0.0567*	0.0620*	-0.0492	0.0553	-0.0215
	(-1.34)	(2.42)	(2.25)	(-1.74)	(1.61)	(-0.76)
Wave3	0.0177	0.0703*	0.0510	0.0270	0.0739	-0.0649*
	(1.11)	(2.49)	(1.38)	(0.63)	(1.87)	(-2.26)
Constant	0.948***	0.874***	0.178***	0.291***	0.638***	0.519***
	(94.91)	(63.54)	(11.15)	(16.52)	(32.85)	(33.48)
N	690	741	726	732	705	699

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8: Treatment effect on own opinions

	(1) ww	(2) seg	(3) fam	(4) child	(5) warm	(6) mjp
ATET						
	-0.000336	0.00334	-0.0154	-0.0754**	0.0602	0.0428
	(-0.01)	(0.13)	(-0.64)	(-2.81)	(1.92)	(1.32)
Controls						
Wave2	-0.0222	0.0918***	0.00293	-0.0355*	-0.0188	0.0417*
	(-1.26)	(5.87)	(0.18)	(-2.43)	(-0.93)	(2.16)
Wave3	0.0784***	0.109***	-0.0216	-0.0154	0.0443	-0.0332
	(3.73)	(5.16)	(-1.12)	(-0.77)	(1.78)	(-1.35)
Constant	0.712***	0.671***	0.234***	0.301***	0.585***	0.218***
	(69.96)	(71.54)	(25.55)	(33.73)	(52.14)	(21.10)
N	690	741	726	732	705	699

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9: Treatment effect on beliefs about male university students' opinions

	(1) ww	(2) seg	(3) fam	(4) child	(5) warm	(6) mjp
ATET						
	0.00206	0.0101	0.000855	-0.0604	-0.0272	-0.0200
	(0.11)	(0.41)	(0.03)	(-1.94)	(-1.07)	(-0.50)
Controls						
Wave2	-0.00474	0.0653***	0.0216	0.00340	-0.0133	0.00961
	(-0.31)	(3.69)	(1.16)	(0.19)	(-0.70)	(0.43)
Wave3	0.0354*	0.111***	-0.0273	-0.0284	0.0799***	-0.0584*
	(2.55)	(5.60)	(-1.16)	(-1.18)	(4.06)	(-1.98)
Constant	0.901***	0.708***	0.383***	0.421***	0.721***	0.609***
	(110.76)	(65.63)	(36.00)	(39.32)	(67.57)	(47.09)
N	690	741	726	732	705	699

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10: Treatment effect on beliefs about female university students' opinions