The Psycho-Social Benefits of Access to Contraception: Experimental Evidence from Zambia

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Abstract

In a field experiment in Lusaka, Zambia, married couples in the catchment area of a family planning clinic were randomly assigned to either a treatment group (N=503) or a control group (N=768). Those in the treatment group received vouchers guaranteeing free and immediate access to two long-term modern contraceptive methods with low failure rates (injectable contraceptives and contraceptive implants), which they could redeem at the family planning clinic over the course of a year. Women in the control group had access to the standard menu of contraceptive methods available in the clinic, and were subject to lengthy waiting times and frequent stock-outs. Follow-up data on contraceptive utilization and mental health outcomes were collected two years after the intervention. Women in the treatment group were significantly more likely to utilize modern contraceptive methods at endline, (95% CI [-0.001, 0.079]; p=0.059). They also exhibit significantly improved mental health relative to the control sample, scoring 0.070 points higher on the mental health index (95% CI [0.006, 0.133]; p=0.031). These effects were observed in the absence of any significant effect on fertility or birth spacing.

Significance Statement

Over the past century, contraceptive access has increased across the globe, but there has been no rigorous study of its effect on women's psychological well-being. Increasing a woman's control over fertility may decrease stress and anxiety levels, which in turn may reduce the incidence of generalized anxiety disorder (GAD) and depression. We conduct a field experiment in Zambia in which women were randomly chosen to receive free and immediate access to a range of hormonal contraceptives, including two long-acting methods not readily available

to those in the control group. Our findings suggest that increasing access to contraception can have immediate effects on women's psycho-social health, even when fertility effects are minimal or have yet to accrue.

Summary

Background
Although contraceptive access has increased dramatically worldwide, to date there is no rigorous empirical evidence on the effect of increased access to modern contraceptive methods on women's mental health and psychological well-being. This study conducts an experiment with married women in Lusaka, Zambia to investigate the relationship between improved access to effective modern contraceptives and women's mental health and well-being.

Methods
We conducted a two-arm field experiment with a large family planning clinic in Lusaka, Zambia. Married women in the catchment area of the clinic were randomly assigned to either a treatment group (N=503) or a control group (N=768). Those in the treatment group received vouchers guaranteeing free and immediate access to two long-term modern contraceptive methods with low failure rates (injectable contraceptives and contraceptive implants), which they could redeem at the family planning clinic over the course of a year. Women in the control group had access to the standard menu of contraceptive methods available in the clinic, where women were required to wait an average of three to four hours to see a nurse and contraceptive methods were frequently stocked out. For example, injectables were out of stock an estimated 50 percent of the time when our experiment began *(1)*. Baseline characteristics of the women assigned to the treatment and control groups were comparable at the time of enrollment (Appendix Table 1).

An earlier study examining the change in contraceptive use associated with this intervention found that women in the treatment group were 18 percentage points more likely to try a new modern method between baseline and follow-up relative to the control group *(2).* To test the causal effect of our intervention on psychological wellbeing, follow-up data on mental health outcomes were collected two years after the intervention. Overall, 92% of participants were successfully followed throughout the study, and retention rates were similar in the two groups.

Findings
Women assigned to the treatment group exhibited signs of improved mental health, scoring 0.070 points higher on the mental health index (95% CI [0.006, 0.133]; p=0.031) compared to women in the control group. The difference is particularly acute among women who were relying on male-controlled methods of birth control at baseline.

Interpretation
Improved access to long-term contraceptive methods with lower failure rates contributes to reduced anxiety and greater feeling of control, particularly among women who are subject to

greater anxiety over becoming pregnant. Social and economic constraints have been found to be significantly correlated with depression, and in this setting easing an important constraint on health production benefitted women via greater psycho-social wellbeing *(3,4)*.

These findings advance interdisciplinary work on the range of interventions that improve mental health and, in particular, on the potential impacts of family-planning policies on individual and household well-being in developing countries. In particular, our results suggest that access to family planning is a key determinant of mental health and that the impact of contraceptives is broader than previously understood. Indirect channels through which family-planning access improves female well-being are particularly relevant given the mixed evidence on the impact of contraceptive access on fertility.

Introduction and Background

Over the past century, contraceptive access has increased enormously across the globe, with mixed empirical evidence on its relationship with declining fertility *(5, 6)*. There have been almost no studies to date on the effect of contraceptive access, particularly access to long-term methods, on women's psychological well-being, which has the potential to improve with contraceptive access even when fertility changes little *(7)*. Findings from qualitative investigations suggest that, for women in Africa, the inability to access family planning services and, more generally, to control their own fertility may constitute an important source of mental stress and anxiety, both of which are directly linked to more severe conditions, including GAD and depression (*12)*. Increasing a woman's control over her own fertility by providing access to and lowering the cost of contraception may therefore contribute to decreases in stress and anxiety levels, which in turn may reduce the incidence of GAD and depression.

While mental health is not a traditional economic indicator, depression has real economic consequences, resulting in work absence, lower productivity, and worse outcomes for children of depressed individuals *(11, 13, 14)*, and may thereby contribute to a poverty trap (*15, 16)*. More broadly, poor mental health is a leading contributor to the global burden of disease, responsible for 11 percent of lost DALYs worldwide and 4 percent in Sub-Saharan Africa (*24)*.

We fill this knowledge gap by conducting a field experiment in Zambia in which women were randomly chosen to receive a voucher that guaranteed free and immediate access to a range of hormonal contraceptives, including two long-acting modern methods (injectables and implants) that were not readily available to couples in the control group, and tracking mental health after two years. Findings from our follow-up study indicate that improving access to contraceptives leads to a significant improvement in women's mental health outcomes.

Methods

Study Sample Selection

Our randomized control trial (RCT) was conducted in Lusaka, Zambia. Despite the relative availability of modern contraceptive methods through both private and public channels, the total fertility rate (TFR) in Zambia is high for the region at 6.2 children per woman, with the TFR in Lusaka estimated to be 4.1 children per woman. Moreover, the fraction of women at risk of an unintended pregnancy (also known as the rate of unmet need for family planning) is particularly

high in Zambia: in our study sample, 49.2% of sexually active women and 48.9% of sexually active men who wish to avoid pregnancy are not using modern contraception (*25).*

We recruited subjects from the catchment area of Chipata Clinic, a large government clinic that serves low-income "compound" (slum) neighborhoods of Lusaka. Community health workers (CHWs) from the clinic were hired to recruit subjects through home visits. We recruited married women of childbearing age (18-40) from the catchment area to participate in the study if they: (a) currently lived with their husband; (b) had last given birth between January 2004 and December 2006; (c) were not currently pregnant; (d) had neither been sterilized nor had a hysterectomy; (e) were not known to have health conditions for which hormonal contraceptives are contraindicated; and (f) agreed to participate in a survey and information session about family planning together with their husband.

Randomization and Procedures

A total of 1,271 women were selected for the trial (*26).* Following recruitment, a team consisting of one survey enumerator and one CHW visited each woman in her home. During this visit, CHWs first re-screened women to ensure that they continued to meet all of the inclusion criteria and still agreed to participate, administered a baseline survey, and then delivered approximately 25 minutes of health information about: the prevention of sexually transmitted diseases (STDs), the benefits of family planning (including information on contraception, birth spacing, and timing), and condom use (*27).* All CHWs had previous experience working with the clinic to implement information campaigns and homecare programs.

Prior to the first visit, recruited women were randomized into treatment (N=503) and control (N=768) groups. Randomization was conducted using the minmax *t*-statistic method *(28),* with treatment assignment balanced on the following variables collected at the time of recruitment: compound, community health worker, number of children, whether currently using any family planning method, whether currently using the pill, whether currently using injectables, and months since last birth.

The key experimental intervention took place during a second visit made to all women assigned to the treatment group, in which women and their husbands were visited concurrently whenever possible. On that occasion, women assigned to the treatment group received a voucher that could be redeemed for free and immediate access to two long-term modern contraceptives through an appointment with a family planning nurse at the clinic. In particular, the voucher guaranteed that, upon redemption:

a) Women would wait a maximum of one hour to receive services. Women who were forced to wait for more than one hour would receive a gift as compensation.
b) Women would be granted free access to two long-term methods with low known-failure rates—injectable contraceptives (Depo-Provera) and contraceptive implants (Jadelle)—that had been out of stock more than half of the time prior to our study. Women would receive these services following a brief in-clinic screening by the administering family-planning nurse to minimize any risk of side effects or contraindications.

The voucher was valid for one month from the day it was issued, and women who redeemed the voucher would have free and immediate access to these long-acting methods for up to one year. In total, 74% of women assigned to the treatment group received the intervention, and those who did not were still included in the follow-up survey. Compliance to protocol was ensured through regular audits at both the household visit and clinic visit stages, and with a specially trained nurse for the study who implemented all clinic visits. Further details on the experimental protocol are provided in Appendix 5.

Low take-up was primarily driven by failure to locate husbands in the respondents' households for a second visit, at which time the voucher was to be provided, after multiple attempts *(29)*. Given the potential non-random attrition, we include all couples assigned to treatment in the analysis regardless of whether they received a voucher (i.e. an intent-to-treat analysis).

The control group (N=768) also received a baseline visit and completed the same survey. Both groups received a follow-up visit approximately two years after the intervention in which contraceptive use and mental health outcomes were measured. In total, 92% of respondents were successfully tracked and resurveyed at follow-up, including 93% of the treatment group and 92% of the control group.

A previous paper documents that women assigned to the treatment group experienced significant increases in contraception use: 38% of women assigned to treatment and 43% of women who received the voucher redeemed the voucher. Of the women who redeemed a voucher, more than half of these went home with injectable contraceptives, leading to an increase in injectable contraceptive use of 16% among women assigned to treatment. Consistent with the short-term results, follow-up survey data indicate that women assigned to the treatment group were significantly more likely to take up new forms of contraception between the baseline and follow-up survey, an effect primarily driven by increased use of injectables *(2)*. At endline, 50% of women in treatment and 43% of women in control reported using injectable contraception in the last two years, and the difference is statistically significant at the 5% level. Although we find changes in contraceptive adoption, we find no change in fertility; treatment and control subjects were equally likely to have a subsequent child.

Measured Outcomes

Mental Health Index

To measure the mental-health impact of the intervention, at the follow-up interview, we asked women a standard battery of survey questions pertaining to their psychological well-being, including measures of both depression and sense of control. The specific questions were taken from the well-established WHO Composite International Diagnostic Interview (WHO-CIDI) survey and were adapted for relevance to the local culture and language *(30)*. The WHO-CIDI is the most comprehensive and most widely accepted survey diagnostic tool for the assessment of mental health, though it takes a considerable amount of time to administer *(31)*. Ten behaviors were deemed culturally-appropriate measures of mental well-being in this setting, and a mental health index was generated from the corresponding 18 dummy variables using the weighted *z*-score methodology outlined in *(32, 33)*.

Validation of Outcome Measure

To validate our results and test the sensitivity of our indicators, we examined the correlation between our index and a number of other measures that have been shown in previous studies to correlate with mental distress (including symptoms of depression and anxiety), including income, educational attainment, gender, household size, and capacity for decision-making (in particular, sexual decision-making). Previous studies have indicated that there exists a negative correlation between income (in particular, income inequality) and depression as well as educational attainment and depression. On the other hand, depression has been shown to be positively correlated with being female, living in larger households, and feeling a lack of control in sexual decision-making *(34,35)*. Correlations from our sample indicate that these relationships indeed hold in our data and are statistically significant, although the association between the constructed mental health index and family size is not significant at the 5% level *(36)*.

Results

For all outcome variables, we estimate the difference between experimental arms using ordinary least squares regressions. We estimate the experimental treatment effect of better access to modern contraceptives, both with and without controls, for the following individual characteristics measured at baseline: wife's and husband's age; wife's and husband's education; wife's and husband's ideal number of children; whether wife is using injectables, pill or any hormonal method; wife's and husband's monthly income; difference between wife and husband's desired fertility; whether wife knows when she is most fertile; months since last birth; difference between husband and wife's number of children; and a dummy if the wife does not want a child in the next two years.

Our regression analysis estimates the effect on mental health of assigning women to the treatment group that offered better access to contraception. In order to shed light on mechanisms through which treatment influences mental health, we also estimate treatment effects for the sub-sample of women whom we expect would be most affected by the fertility control offered via the experiment: those who used male-controlled contraceptive methods at baseline. This sub-sample, which is balanced between treatment and control groups on observable characteristics at baseline, consists of women who were relying on condoms and withdrawal at baseline. Given that these methods rely entirely on men's choices and actions, we hypothesize that women in this sub-sample experienced a disproportionate demand for—and thus consequent improvements in mental health from—the experience of better controlling their own fertility outcomes.

The first panel of Table 1 shows the effect of treatment on use of modern contraceptives at follow-up. As documented in greater detail in a previous study *(2)*, utilization of any modern method was significantly higher for the treatment group relative to the control group. Much of this result is driven by the increase in injectable use among women in the treatment group (column 2). The intervention increased take-up of modern contraception methods by 5% and increased take-up of injectable contraception by 16%, providing women significantly greater control over their reproductive health. Furthermore, the effect on injectable use is more than twice as large among the sub-sample of women who were relying on male-controlled contraceptive methods (condoms and withdrawal) at baseline, who experienced a 54% increase in the rate of injectable use between baseline and follow-up.

[INSERT TABLE 1]

Table 2 presents regression results for the mental health index for the full sample and for the sub-group of women utilizing male-controlled methods at baseline. A regression coefficient indicates the position of the mean of the treatment group relative to the control group in terms of standard deviation units. A higher coefficient value represents higher reporting of positive mental-health indicators, while a negative coefficient on the treatment sample indicates a lower index value relative to the control group. The mental health for women in the treatment group relative to the control sample was significantly higher, by 0.070 SD, among the full sample of women, which indicates a significant improvement in mental well-being. The estimated treatment effect among the sub-sample whose husbands controlled contraception at baseline is almost twice as large, consistent with our interpretation that changes in contraceptive utilization are driving the improvement in mental well-being. The women who had previously relied on their husbands for birth control were those who benefited most, in mental health terms, from improved access to hormonal methods.

[INSERT TABLE 2]

Appendix Table 2 describes in detail the 18 questions used to construct the mental health index and shows treatment coefficients by each measure separately. The estimates indicate a positive effect of improved access to birth control on almost all of the indicators. In particular, we estimate a large negative (greater than 0.02 SD) treatment effect for 16 out of 18 measures and 9 out of 10 behaviors, and point estimates close to zero (within 0.015 SD in absolute value) for 1 of the behaviors (crying excessively). Statistically significant effects are found among 4 out of the 10 behaviors.

Discussion

There are a number of pathways through which a change in access to contraceptives can affect mental health. Although our study was not designed to distinguish these pathways per se, we attempt, in this section, to shed light on the channels driving the effect we measure.

Our results primarily point to the importance of fertility control for mental health, even if that control is used only to space births (and not to lower overall fertility). Indeed, lower overall fertility is unlikely to be the pathway for our effect, as we find no fertility effect at the time of the follow-up survey *(2, 37)*. This also rules out a direct biological pathway between mental health and access to contraceptives that could arise as a result of being pregnant or post-partum *(38)*, since we also do not find a difference in reported rates of pregnancy or recent birth in the treatment versus control *(39)*. The possibility that the contraceptives themselves could have a mood-altering affect is similarly ruled out, as we do not see differences in *current* use of injectables or other contraceptives at follow-up *(39)*.

This suggests that individuals in the treatment group benefit from the treatment simply because it takes less effort to exert the same amount of fertility control than it did previously. That is, even if individuals manage to achieve the same fertility outcome, *ease* of control over fertility

has the potential to improve mental health outcomes. Treatment effects on self-reported feelings of control provide additional support for this pathway. As Table A3 shows, the treatment group had a significant downward shift in the main measure of control over one's life: "believes individuals have little or no control or free choice". The link between lack of control, helplessness and depression has been extensively studied and documented *(40-45)*. Easing the types of constraints that create a lack of control and hopelessness, constraints which often disproportionately affect impoverished women, could have significant effects on depression in the developing world. For example, women who gained access to literacy in India showed substantial decreases in rates of depression *(46)*. An evaluation of the Moving to Opportunity program in major urban centers in the US found that when families moved from poverty-marked neighborhoods to more affluent areas, mental health of the parents improved (*4)*. Removing a social constraint—in this case, residency in a low-income neighborhood—led to a decrease in depression similarly to the pathways in play in our study. This is further supported by our sub-sample results, which show that women whose husbands previously controlled family planning were those who most benefited from the improvement in mental health, via the additional control that access to reliable methods provided.

Increased access to contraceptives in our study provided a sense of increased control to women over the outcomes of their lives. Behavioral decision research has documented that individuals overweight low-probability events (*47*), overestimating the chance of, for example, obtaining lung cancer from smoking *(48*).

Our result indicates that reduced fear of unintended pregnancy is an important driver of improvements in women's psychological well-being.

Conclusions

Our findings suggest that increasing access to contraception has immediate effects on women's psycho-social health, even when fertility effects are minimal or have yet to accrue. This provides additional justification for public efforts to boost access to hormonal methods, which is particularly important, given that improving access is not necessarily associated with lower fertility *(2)*.

It also suggests that limited control over fertility may be an important factor contributing to poor mental health outcomes among women in less developed countries. In recent years the World Health Organization (WHO) has highlighted the global growth of mental health illnesses, particularly depression and anxiety, as a serious international public health issue *(49)*. Unipolar depression remains the leading cause of years lived with disability (YLD) and the fourth largest disease burden for women globally *(50)*. The association between the disease and gender is particularly striking, as women are almost twice as likely as men to report signs of depression in any country. While diagnosing mental illnesses does vary considerably by gender, women's higher exposure to poverty, discrimination, and gender-based violence relative to men in developing countries is believed to make them more susceptible to depression. Our findings suggest that the disproportionate burden of child-bearing, and the anxiety that accompanies that role when family planning services are unavailable, may also play an important role in the mental health disparity.

Acknowledgements

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26. This was part of a larger study (the Zambia Contraceptive Access Study) that had an additional treatment arm where women received the voucher without the husband present. This additional treatment arm, which potentially generates stress on the marriage, does not isolate the specific effect of access that we are trying to understand and is therefore excluded from this study *(2)*.
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37. To the extent that a change in contraceptive access leads directly to changes in fertility rates, a woman's psychological well-being can be enhanced through welfare improvements derived from lower numbers of unwanted children, including: better physical health, more control over working outside of the home, higher income, less financial stress, etc. (*51*) However, given that we find no differences in overall fertility rates between treatment and control women at the time of follow-up in previous work *(2)*, none of these pathways could explain our results on psychological well-being at the time of the follow-up survey. That is, that there is no reason to expect work hours and income to change in response to future (conditional on current) fertility.
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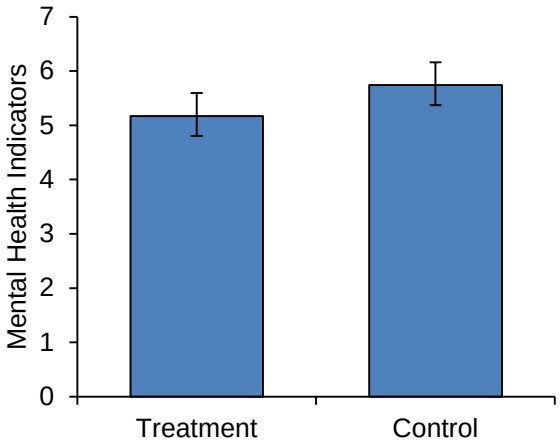
Figure 1
Mean Count of Mental Health Indicators
Treatment versus Controls



Notes:
[1] The mean count of mental health indicators is the average number of questions the respondent answered indicating depressive symptoms. There were 18 questions asked regarding women's mental health.

[2] Error bars indicate the 95% confidence interval around the mean.

Table 1
Effect of Improved Access to Contraception on Contraceptive Utilization at Follow-up

	Full Sample		Husband Controls Contraception	
	Used Modern Method at Follow-up	Used Injectable at Follow-up	Used Modern Method at Follow-up	Used Injectable at Follow-up
Assigned to Contraceptive Treatment				
Without Covariate	0.039*	0.070**	0.045	0.177***
	(0.020)	(0.030)	(0.055)	(0.061)
With Covariates	0.042**	0.072**	0.081	0.227***
	(0.020)	(0.029)	(0.057)	(0.062)
Mean of Outcome Variable for Control Group	0.848	0.436	0.716	0.325
Observations	1,172	1,163	276	272

[1] Covariates include: age, husband's age, education, husband's education, number of children, wife's ideal # of children, husband's ideal # of children, using injectables at baseline, using pill at baseline, using any hormonal contraceptive at baseline, wife's monthly income, husband's monthly income, difference in desired fertility of couple, wife knows when she is most fertile, woman's age > 40, time since last birth, difference between husband's and wife's total number of children, and dummy if wife does not want child in next two years.

[2] The survey questions used to examine mental health outcomes are listed in Appendix Table 2. Appendix Table 3 provides the individual regressions for each questions and indicates which questions were used to construct the Mental Health Index.

[3] A modern method includes the following contraceptive methods: injectables, IUDs, the pill and implants.

Table 2
Effect of Improved Access to Contraception on Mental Health Index at Follow-up

	Full Sample	Husband Controls Contraception
Assigned to Contraceptive Treatment		
Without Covariate	0.070**	0.083**
	(0.032)	(0.037)
With Covariates	0.062*	0.078**
	(0.033)	(0.039)
Mean of Outcome Variable for Control Group	-0.001	0.030
Observations	(0.203)	(0.233)

Notes:

[1] Covariates include: age, husband's age, education, husband's education, number of children, wife's ideal # of children, husband's ideal # of children, using injectables at baseline, using pill at baseline, using any hormonal contraceptive at baseline, wife's monthly income, husband's monthly income, difference in desired fertility of couple, wife knows when she is most fertile, woman's age > 40, time since last birth, difference between husband's and wife's total number of children, and dummy if wife does not want child in next two years.

[2] The survey questions used to examine mental health outcomes are listed in Appendix Table 2. Appendix Table 3 provides the individual regressions for each question and indicates which questions were used to construct the Mental Health Index.

[3] A husband is said to be in control of the contraceptive method if, at baseline, the wife reported the use of either condoms or withdrawal as the birth control method the couple was currently using.

Appendix Table 1
Summary Statistics for Recruited Sample

		Treatment Group			Control Group			P-value for Difference of Means Treatment and Control
	Variable	Mean	SD	N	Mean	SD	N	
Panel A								
1	Highest schooling attained	5.97	3.31	503	5.53	3.51	768	0.035
2	Husband's highest schooling attained (reported by wife)	8.51	3.84	503	8.40	3.71	768	0.599
3	Ideal number of children	3.96	1.59	503	3.91	1.52	768	0.520
4	Age	27.29	6.73	503	26.93	6.33	768	0.425
5	Husband's age (reported by wife)	30.11	13.00	503	29.08	13.34	768	0.206
6	Husband's ideal number of children (reported by wife)	3.91	2.19	503	4.00	2.03	768	0.470
7	Has ever used a modern contraceptive method	0.86	0.34	503	0.85	0.35	768	0.544
8	Wife has monthly income	0.39	0.49	503	0.34	0.47	768	0.059
9	Wife knows when she is most fertile	0.11	0.32	503	0.13	0.33	768	0.701
10	Wife wants to become pregnant in following 2 years	0.26	0.44	503	0.25	0.43	768	0.607
11	Age wife married	19.15	4.21	497	19.04	3.72	755	0.685
12	Catholic	0.23	0.42	503	0.22	0.41	768	0.652
13	Comparison of happiness with other women in region (1=very unhappy, 5=very happy)	3.56	0.86	503	3.52	0.86	768	0.356
14	Comparison of health with other women in region (1=very poor, 5=excellent)	3.65	0.79	502	3.61	0.72	768	0.222
15	Number of years respondent lived in Lusaka	18.06	10.78	501	18.93	10.52	763	0.131
16	Couple has electricity	0.39	0.49	503	0.38	0.49	768	0.821
17	Formally married	0.88	0.33	503	0.85	0.36	764	0.135
18	Number of days in past 7 days couple has sex	2.00	1.65	501	2.08	1.75	765	0.576
19	Number of days in past month couple has sex	7.89	5.47	496	8.23	5.88	752	0.515
20	Number of children husband has with other women	0.30	0.46	494	0.26	0.45	754	0.207
21	Frequency at which couple has talked about contraception in last year	1.68	1.07	503	1.70	1.06	764	0.977
22	Couple has ever disagreed on number of children	0.14	0.34	503	0.16	0.36	765	0.127
23	Couple has ever disagreed on contraception use	0.13	0.33	503	0.10	0.29	763	0.283
24	Have used contraceptive method without husband's knowledge	0.15	0.36	501	0.12	0.32	758	0.201
25	Husband drinks at least 2 to 3 times a week	0.42	0.49	503	0.41	0.49	768	0.621
26	Husband has ever threatened physical violence	0.56	0.50	503	0.55	0.50	765	0.983
27	Wife ever pressured to have sex	0.54	0.50	503	0.58	0.49	768	0.114
28	Not sleeping interfered with normal activities	0.14	0.35	502	0.14	0.34	763	0.815
29	Husband decides major purchases	0.65	0.48	503	0.61	0.49	767	0.236
							Chi2	**32.89**
							Probability < Chi2	**0.282**
Panel B								
1	Using any method at baseline	0.85	0.36	503	0.84	0.36	768	0.493
2	Number of living children	2.87	1.85	503	2.73	1.69	768	0.251
3	Using injectable at baseline	0.22	0.41	503	0.19	0.39	768	0.138
4	Using pill at baseline	0.28	0.45	503	0.30	0.46	768	0.526
5	Using a hormonal contraceptive at baseline	0.51	0.50	498	0.49	0.50	756	0.351
6	Has ever used an injectable contraceptive method	0.42	0.49	503	0.41	0.49	768	0.769
7	Months since last birth (at recruitment)	15.14	6.30	503	15.33	6.81	768	0.487
8	Husband's age (reported by husband)	25.51	16.50	503				
9	Husband's highest schooling attained (reported by husband)	6.49	4.54	503				
10	Husband's ideal number of children (reported by husband)	3.28	2.66	503				
11	Husband's average monthly income (1,000 USD) (reported by husband)	0.11	0.24	503				
12	Number of children in the household	2.87	1.85	503	2.73	1.69	768	0.251
13	Wife earned money in previous month	0.45	0.50	498	0.42	0.49	766	0.417
14	Husband works 40+ hours	0.55	0.50	473	0.62	0.49	722	0.058
15	Wife ever pressured violently to have sex	0.15	0.36	501	0.14	0.35	767	0.768
16	Husband decides savings	0.63	0.48	500	0.65	0.48	766	0.659
17	Husband holds the money	0.17	0.37	499	0.13	0.34	761	0.097

Notes:

[1] Sample includes all women who participated in the baseline survey ("Recruited sample").

[2] Variables 1-6 in Panel B come from the tracking data, not the baseline survey data. The tracking data was used to balance the samples. All other data come from husband and wife baseline surveys. If not specified, data come from wife's baseline survey.

[3] Variable "Couple has talked about contraception in the last year" takes on the following values: 0 = never, 1 = once or twice, 2 = three or fou times, 3 = five or more times.

[4] Modern contraception includes pill, IUD, implant, injectable, diaphragm, female and male sterilization.

[5] Concealable methods include: IUDs, implants and injectables.

Appendix Table 2
Survey Questions

Mental Health Index

In the next questions, I am interested in knowing how you feel in general and how it affects your life.

J1	People differ a lot in how much they worry about things. In the **past 2 years**, did you have a time when you worried a lot more than most people would in your situation?	Yes	1
		No	0
		Refuse to say	-777
		Don't know	-999
J2	How much did this interfere with your normal activities?	A lot	1
		Some	2
		A little	3
		Not at all	4
		Don't know	-999

Now I will ask you to tell me how often you felt in a certain way or did a certain action and how much it affected your normal activities.

[Read column B replacing […] by the statement in column A. If "some of the time" or "Most of the time", go to column C. If not, go to next row.]

	Column A	**Column B**			**Column C**	
		How often did you […] **during the past month**?			How much did this interfere with your normal activities?	
J4.1-J4.2	cry more than twice a week	Never	1	>**J5**	A lot	1
		Some of the time	2		Some	2
		Most of the time	3		A little	3
		Refuse to say	777	>**J5**	Not at all	4
		Don't know	-999	>**J5**	Don't know	-999
J5.1-J5.2	feel sad more than you felt happy	Never	1	>**J6**	A lot	1
		Some of the time	2		Some	2
		Most of the time	3		A little	3
		Refuse to say	777	>**J6**	Not at all	4
		Don't know	-999	>**J6**	Don't know	-999
J6.1-J6.2	not feel like eating	Never	1	>**J7**	A lot	1
		Some of the time	2		Some	2
		Most of the time	3		A little	3
		Refuse to say	777	>**J7**	Not at all	4
		Don't know	-999	>**J7**	Don't know	-999
J7.1-J7.2	Not sleeping interfered with normal	Never	1	>**J8**	A lot	1
		Some of the time	2		Some	2
		Most of the time	3		A little	3
		Refuse to say	777	>**J8**	Not at all	4
		Don't know	-999	>**J8**	Don't know	-999
J8.1-J8.2	wake up twice or more a night or could not	Never	1	>**J9**	A lot	1
		Some of the time	2		Some	2
		Most of the time	3		A little	3
		Refuse to say	777	>**J9**	Not at all	4
		Don't know	-999	>**J9**	Don't know	-999
J9.1-J9.2	feel unable to concentrate at school or	Never	1	>**J10**	A lot	1
		Some of the time	2		Some	2
		Most of the time	3		A little	3
		Refuse to say	777	>**J10**	Not at all	4
		Don't know	-999	>**J10**	Don't know	-999
J10.1-J10.2	feel worthless	Never	1	>**J11**	A lot	1
		Some of the time	2		Some	2
		Most of the time	3		A little	3
		Refuse to say	777	>**J11**	Not at all	4
		Don't know	-999	>**J11**	Don't know	-999

Appendix Table 2
Survey Questions

In the next questions, I am interested in hearing about your well-being and your beliefs.

J11	All things considered, how satisfied are you with your life as a whole these days? Please tell me which number on this scale more adequately represents your level of satisfaction with your life as a whole: 1 means you are "*completely dissatisfied*" and 5 means you are "*completely satisfied*".	Completely dissatisfied	1
		Mostly dissatisfied	2
		Neither dissatisfied nor satisfied	3
		Mostly satisfied	4
		Completely satisfied	5
J12	[2] Variables 1-6 in Panel B come from the tracking data, not the baseline survey data. The tracking data was used to balance the samples. All other data come from husband and wife baseline surveys. If not specified, data come from wife's baseline survey.	No choice at all	1
		Very little choice	2
		Half choice	3
		A lot of choice	4
		A very great deal of choice	5
J13	Some people believe that individuals can decide their own destiny, while others think that it is impossible to escape a predetermined fate. Please tell me which comes closest to your view on this scale: 1 means "*everything in life is determined by fate*" and 5 means that "*people shape their fate themselves*". (only one answer)	Everything in life is determined by fate	1
		Most of the things in life are determined by fate.	2
		About half of things in life are determined by fate	3
		People shape most of their fate themselves	4
		People shape their entire fate themselves	5
J14	Please tell me which of the following statements comes closer to describing you:	I feel I have little influence over the things that	1
		What happens to me is largely my own doing	2

The next series of sentences describes the way some people feel about how much control they have over their lives. After each statement, please tell me whether you strongly disagree, disagree, agree or strongly agree....

J15	I have little control over the things that happen to me.	Strongly disagree	1
		Disagree	2
		Agree	3
		Stongly agree	4
J16	I can do just about anything I really set my mind to.	Strongly disagree	1
		Disagree	2
		Agree	3
		Stongly agree	4
J17	I often feel helpless in dealing with problems in life.	Strongly disagree	1
		Disagree	2
		Agree	3
		Stongly agree	4
J18	What happens to me in the future mostly depends on me.	Strongly disagree	1
		Disagree	2
		Agree	3
		Stongly agree	4
J19	There is little I can do to change many of the important things in my life.	Strongly disagree	1
		Disagree	2
		Agree	3
		Stongly agree	4

Appendix Table 3
Estimated Treatment Effect on Individual Components of Mental Health Index
and Measures of Sense of Control

	Full Sample	
Dependent Variable	Coefficient on Treatment	Coefficient on Treatment with Covariates
Mental Health Indicators		
Worries more than others in similar situations	-0.027	-0.022
	(0.031)	(0.031)
Worry interfered with normal activities	-0.042	-0.042
	(0.031)	(0.031)
Cried more than twice a week in the last month	0.013	0.017
	(0.026)	(0.027)
Crying in last month interfered with normal activities	0.006	0.009
	(0.026)	(0.026)
Felt more sad than happy in the last month	-0.051*	-0.050*
	(0.029)	(0.030)
Feeling sad interfered with normal activities	-0.054*	-0.051*
	(0.030)	(0.031)
Felt like not eating in the last month	-0.030	-0.027
	(0.030)	(0.031)
Not wanting to eat interfered with normal activities	-0.052*	-0.041
	(0.029)	(0.029)
Felt like not working in the last month	-0.024	-0.014
	(0.030)	(0.031)
Not feeling like working interfered with normal activities	-0.033	-0.015
	(0.030)	(0.030)
Couldn't sleep in the last month	-0.022	-0.012
	(0.029)	(0.029)
Not sleeping interfered with normal activities	-0.040	-0.031
	(0.029)	(0.029)
Was unable to concentrate in the last month	-0.055**	-0.059**
	(0.027)	(0.028)
Being unable to concentrate interfered with normal activities	-0.060**	-0.063**
	(0.027)	(0.027)
Felt worthless in the last month	-0.033	-0.033
	(0.024)	(0.024)
Feeling worthless interfered with normal activities	-0.026	-0.026
	(0.024)	(0.024)
Not satisfied with life today	-0.037*	-0.037*
	(0.020)	(0.021)
Feels helpless dealing with life problems	-0.021	-0.023
	(0.030)	(0.031)
Beliefs about Control		
Believes individuals have little or no control or free choice	-0.043*	-0.042*
	(0.024)	(0.023)
Believes most things are determined by fate	0.002	-0.004
	(0.029)	(0.029)
Feel have little influence over my life	-0.021	-0.027
	(0.030)	(0.030)
Has little control over what happens to self	-0.010	-0.012
	(0.030)	(0.030)
Usually isn't able to accomplish things that they set their mind to	-0.055*	-0.044
	(0.029)	(0.030)
Doesn't have much control over what happens to them in the future	0.010	0.010
	(0.030)	(0.030)

Appendix Table 4
Summary Statistics for Recruited Sample Where Husband Controlled Baseline Method

	Variable	Treatment Group Mean	Treatment Group SD	Treatment Group N	Control Group Mean	Control Group SD	Control Group N	P-value for Difference of Means Treatment and Control
Panel A								
1	Highest schooling attained	5.77	3.35	123	5.61	3.47	172	0.606
2	Husband's highest schooling attained (reported by wife)	8.25	3.71	123	8.18	3.69	172	0.940
3	Ideal number of children	4.02	1.57	123	4.01	1.53	172	0.865
4	Age	27.58	6.75	123	27.34	6.05	172	0.836
5	Husband's age (reported by wife)	30.82	12.54	123	29.24	13.69	172	0.386
6	Husband's ideal number of children (reported by wife)	3.99	2.61	123	4.11	2.10	172	0.725
7	Has ever used a modern contraceptive method	0.80	0.40	123	0.76	0.42	172	0.346
8	Wife has monthly income	0.36	0.48	123	0.35	0.48	172	0.957
9	Wife knows when she is most fertile	0.07	0.26	123	0.12	0.32	172	0.358
10	Wife wants to become pregnant in following 2 years	0.28	0.45	123	0.29	0.45	172	0.788
11	Age wife married	19.33	4.51	122	19.14	3.72	170	0.715
12	Catholic	0.24	0.43	123	0.23	0.43	172	0.934
13	Comparison of happiness with other women in region (1=very unhappy, 5=very happy)	3.50	0.84	123	3.53	0.87	172	0.880
14	Comparison of health with other women in region (1=very poor, 5=excellent)	3.67	0.83	123	3.57	0.69	172	0.234
15	Number of years respondent lived in Lusaka	18.98	11.41	123	18.67	10.73	172	0.823
16	Couple has electricity	0.32	0.47	123	0.36	0.48	172	0.441
17	Formally married	0.88	0.33	123	0.89	0.31	171	0.756
18	Number of days in past 7 days couple has sex	1.89	1.63	123	1.97	1.73	172	0.778
19	Number of days in past month couple has sex	7.79	5.95	121	8.40	6.22	170	0.527
20	Number of children husband has with other women	0.26	0.44	119	0.24	0.44	170	0.824
21	Frequency at which couple has talked about contraception in last year	1.67	1.08	123	1.64	1.03	171	0.636
22	Couple has ever disagreed on number of children	0.12	0.33	123	0.15	0.35	171	0.434
23	Couple has ever disagreed on contraception use	0.11	0.32	123	0.08	0.28	170	0.520
24	Have used contraceptive method without husband's knowledge	0.09	0.29	123	0.10	0.30	170	0.644
25	Husband drinks at least 2 to 3 times a week	0.41	0.49	123	0.39	0.49	172	0.772
26	Husband has ever threatened physical violence	0.58	0.50	123	0.50	0.50	171	0.244
27	Wife ever pressured to have sex	0.55	0.50	123	0.57	0.50	172	0.601
28	Not sleeping interfered with normal activities	0.16	0.36	122	0.10	0.30	171	0.251
29	Husband decides major purchases	0.57	0.50	123	0.57	0.50	172	0.924
							Chi2	**15.56**
							Probability < Chi2	**0.980**
Panel B								
1	Using any method at baseline	0.81	0.39	123	0.86	0.33	172	0.372
2	Number of living children	2.79	1.93	123	2.71	1.58	172	0.887
3	Using injectable at baseline	0.12	0.33	123	0.08	0.28	172	0.216
4	Using pill at baseline	0.09	0.29	123	0.17	0.37	172	0.035
5	Using a hormonal contraceptive at baseline	0.21	0.41	123	0.25	0.44	170	0.393
6	Has ever used an injectable contraceptive method	0.25	0.44	123	0.22	0.42	172	0.439
7	Months since last birth (at recruitment)	13.93	6.06	123	15.05	6.52	172	0.071
8	Husband's age (reported by husband)	27.18	15.44	123				
9	Husband's highest schooling attained (reported by husband)	6.73	4.12	123				
10	Husband's ideal number of children (reported by husband)	3.60	2.67	123				
11	Husband's average monthly income (1,000 USD) (reported by husband)	0.12	0.29	123				
12	Number of children in the household	2.79	1.93	123	2.71	1.58	172	0.887
13	Wife earned money in previous month	0.42	0.50	123	0.46	0.50	172	0.462
14	Husband works 40+ hours	0.56	0.50	114	0.66	0.47	157	0.128
15	Wife ever pressured violently to have sex	0.15	0.35	123	0.11	0.32	172	0.395
16	Husband decides savings	0.61	0.49	122	0.67	0.47	172	0.346
17	Husband holds the money	0.17	0.38	123	0.11	0.33	167	0.240

Notes:

[1] Sample includes all women who participated in the baseline survey ("Recruited sample").

[2] Variables 1-6 in Panel B come from the tracking data, not the baseline survey data. The tracking data was used to balance the samples. All other data come from husband and wife baseline surveys. If not specified, data come from wife's baseline survey.

[3] Variable "Couple has talked about contraception in the last year" takes on the following values: 0 = never, 1 = once or twice, 2 = three or four times, 3 = five or more times.

[4] Modern contraception includes pill, IUD, implant, injectable, diaphragm, female and male sterilization

[5] Concealable methods include: IUDs, implants and injectables.

[6] A husband is said to be in control of the contraceptive method if, at baseline, the wife reported the use of either condoms or withdrawal as the birth control method the couple was currently using.

Appendix 5: Materials and Methods

Details and Protocols of Voucher Intervention

Each of the inclusion criteria for study subjects was screened by the CHW during recruitment visits. In addition, women were thoroughly screened for health conditions in criteria 3 and 5 if and when they visited the family-planning nurse at the clinic. Disqualifying health conditions included diabetes, heart disease and high blood pressure.

To minimize confusion over the offer period, the expiration date was written clearly on each voucher by the CHW on the day of the second visit. To ensure that vouchers were not used by individuals outside of our sample, the wife's name and national ID numbers were written on the voucher by enumerators, and women were instructed to bring their ID cards to the clinic at the time of the visit to be verified before receiving services. Responses to the debriefing survey were also used to verify the identities of women using the voucher.

In order to guarantee wait-free appointments, we hired a dedicated nurse for the study whose primary responsibilities included: (1) verifying the identity of the woman and the validity of the voucher; (2) providing pre-treatment consultations, including information on available contraceptive methods; (3) recommending a contraceptive method (or methods) based on the woman’s in-clinic health screening results and preferences for either injectable contraceptives or for implant contraceptives; (4) administering injections and implants to women who demanded them; and (5) maintaining an inventory of supplies and a record of women who sought services.

The nurse was hired for two days per week (Mondays and Saturdays) for approximately three hours per day (between 2:00 PM and 5:00 PM). Women could only redeem the vouchers during these days and times and in the presence of the hired nurse. In order to provide guaranteed and free access to the two long-acting methods, we purchased sufficient stocks of Depo-Provera injectable contraceptives and Jadelle contraceptive implants to treat all women in the sample for at least one year. Sufficient stocks of other modern contraceptive methods (condoms, pills, and IUDs) were already available at the clinic. To keep waiting lines short, we spaced the intervention over four months, distributing approximately 50 vouchers per week. These contraceptive stocks and the hired nurse were reserved exclusively for women in our study.

Construction of Mental Health Index

In accordance with the WHO-CIDI, most questions were asked in two parts. In the first part, a woman was asked how often she had experienced a specific state (e.g., sadness, crying, insomnia, worthlessness, lack of concentration, lack of appetite, among others) over the past month. If she responded positively, she was then asked to what extent these feelings interfered with her daily activities. For each reported interfering emotion, she was assigned a value of 1, irrespective of the degree of interference. This resulted in a list of 18 binary indicators of mental

well-being encompassing ten behavioral outcomes.[1] A mental health index was generated from the corresponding 18 dummy variables using the weighted z-score methodology outlined in Kling, Liebman and Katz, 2007.

[1] Questions about two behaviors were posed without follow-up questions about the level of interference they caused in daily activities; for this reason, the total number of indicators is 18 rather than 20.