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Abstract

The study analyzes how a guaranteed income program that significantly increases work incentives affects childbearing among previously unemployed women. Results from previous research indicate that improving individuals' financial circumstances could increase fertility by compensating for the costs of childbearing. However, overall changes in cash incentive structures may create causal mechanisms with opposite effects. The study provides new empirical evidence on the effect of cash transfers on childbearing by using register data from the Finnish basic income experiment conducted in 2017–2018. The intervention aimed to increase returns from employment relative to unemployment but, at the same time, disincentivized childbearing in relation to competing activities, such as employment and studying. The experiment offers a unique opportunity to study the causal effect of changes in income and cash incentives on childbearing decisions. The results of the study indicate that the experiment had a negative effect on the probability of having children among women who received basic income and a positive effect among women whose spouses received basic income. The findings emphasize the importance of considering the overall changes in the cash incentives when reforming tax-benefit policies to avoid potentially undesired social consequences.

Keywords: Childbearing, cash transfers, basic income, field experiment, low-income women

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Introduction

The study aims to investigate the role of income and especially cash incentives in the timing of having a child among low-income women in the context of a cash transfer reform. Several previous studies have tried to explore how changes in cash transfer policies affect family choices (e.g., Andersen et al. 2018; Azmat & González 2010; Baughman & Dickert-Conlin 2003, 2009; Berniell et al. 2020; Bitler et al. 2004; Cain & Wissoker 1990; Cohen et al. 2013; González & Trommlerová 2021; Groeneveld et al. 1980; Hu 2003; Moffitt 1990; Rosenzweig 1999; Weiss & Willis 1997; Yonzan et al. 2020). Findings from the studies vary depending on the details of policy reforms and the contexts of policy implementation, indicating a complex relationship between income, cash transfers, changes in incentive structures, and childbearing decisions.

During the last decades, guaranteed income programs–i.e., unconditional cash transfers, or basic income–have gained popularity as alternative social policy tools to the mainstream tax-benefit systems to reduce poverty and provide equal life chances for individuals. In a welfare state context, these policies are assumed, for example, to increase individuals' financial autonomy and employment by removing the so-called welfare traps created by the distortions in the mainstream tax-benefit systems. So far, however, there has been only little evidence available on the social consequences of these policy alternatives. To contribute to the knowledge gap, this study examines the short-term fertility effects of a temporary guaranteed income program among low-income women.

In general, identifying the effects of social policies on demographic outcomes is challenging because family choices are greatly influenced by factors like social norms and personal preferences, which are difficult to observe. However, social policy experiments can provide a promising framework for contributing to the research. This article utilizes the study design

and data from the Finnish basic income experiment, a randomized field experiment conducted in 2017–2018, to investigate the effects of cash incentives on childbearing. The Finnish experiment offers an interesting case to explore because it tested a welfare alternative that improved the participants' financial situation with a guaranteed income. Results from previous research indicate that improving individuals' financial circumstances may increase fertility by providing compensation for the costs of childbearing (e.g., Bleakley & Ferrie 2016; Bulman et al. 2022; Cesarini et al. 2023; Tsai et al. 2022). However, the Finnish experiment also increased the participants' cash returns from, e.g., work and studying, but not from having a child and, thus, created an incentive to postpone childbearing after the experimentation period.

In the experiment, a non-taxable cash payment (a basic income) equal to the net amount of the mainstream basic unemployment allowance, sickness allowance, or parental benefits, was delivered to the participants unconditionally, regularly, and individually. The policy did not alter the level of income for most beneficiaries because basic income payments were deducted from primary social benefits. Instead, it increased cash returns from work because basic income payments were not tested against employment status or earnings.

By design, the experiment improved the economic resources of full-time workers, students, and those receiving no benefits from the mainstream cash transfer system. However, it did not affect the income of the participants who were taking care of a newborn full-time. Childbearing is, at least partly and in a short time perspective, a life choice that is complement to, e.g., working or studying full-time. If the effect of the changes in the incentive structures dominated other potential causal mechanisms affecting the participants' fertility decisions, then a negative total effect on childbearing among female participants would be observed.

The study design of the Finnish basic income experiment and the available Finnish register data provide a unique opportunity to assess the fertility effects of restructuring cash incentives among low-income women. The study design of a randomized field experiment surpasses the limitations of observational studies by producing an exogenous change in the incentive structures and by providing a control group against which to measure the changes that follow.

The study contributes to the knowledge of how changes in cash transfer policies can affect childbearing behavior among the low-income population. This knowledge is vital for assessing policy alternatives and for designing policies that minimize unintentional and undesired social side effects.

Previous Research

Reforming cash transfer programs is often a trade-off between the potential benefits of the transfers and their costs. The costs include distortions that the programs and policies generate through their eligibility and calculation rules (Aizer et al. 2020). The potential distortions might have unintended effects on the behavior and well-being of the individuals and families. As a result, fertility effects of cash transfers have received considerable attention in social research (Moffitt 1992).

Some empirical studies have examined the effects of conditional cash transfers on fertility in low-income countries. Conditional cash transfers have been designed to incentivize e.g., schooling instead of childbearing because, especially among young women, childbearing may reduce opportunities for education, increase the likelihood of poverty, and have detrimental effects on the health of the women and their children. For example, Gulemetova-Swan (2009) analyzed the effects of conditional cash transfers on young women's fertility decisions by using data from the 2002–2004 evaluation study of the urban Oportunidades (Progresa)

program, a nationwide antipoverty intervention in Mexico. The program aims to improve education, health, and nutrition through conditional cash transfers and health education. In the program, cash payments are conditional on regularly attending high school and having mandatory health checkups and educational health sessions. According to the study, young women (under 22 years old) living in the intervention areas significantly delayed having their first and second child.

Other studies have shown that unconditional cash transfers may also work effectively in the context of low-income countries. For example, in an experimental study conducted in Malawi, Baird et al. (2011) found that pregnancy rates were substantially lower in the group receiving unconditional cash transfers compared to the group receiving cash transfers conditional to schooling. The found effects were due to the impact of unconditional cash transfers on fertility outcomes among girls who dropped out of school.

Bastagli et al. (2019) reviewed the findings in a research literature published during 2000–2015 about the impact of non-contributory cash transfers on individuals and households in low and middle-income countries. They concluded that the evidence points to cash transfers having a significant negative impact on women's fertility choices. The exceptions to this rule are policies that link the levels of cash payments to the number of children (e.g., Stecklov et al. 2006).

In the high-income countries, cash transfer policies often aim to reduce poverty or provide monetary compensation for those who are unemployed or temporarily outside the labor force (e.g., when taking care of a child at home). In this context, the aims of cash transfer policies regarding fertility are less pronounced, even though policies aiming to affect fertility also exist.

In North American and European countries, the available studies on fertility outcomes of cash transfers are mostly non-experimental, and thus the causal evidence on fertility outcomes is limited. One group of studies focuses on benefits that compensate for the costs of having a child. For example, Aizer et al. (2020) assessed whether the mother's fertility outcomes were affected by receipt of a cash transfer from the Mothers' Pension Program implemented in the United States (US) in the early 20th century. The program created an incentive to have more children, as the level of the transfer was determined as an increasing function of the number of children. The study found that, contrary to expectations, recipients of the program were not more likely to have children after the transfer was introduced.

More recently, González & Trommlerová (2021) studied the introduction and termination of a universal child benefit in Spain in 2007 and 2010, respectively. They found that the introduction of the policy led to a 3% increase in birth rates. The announcement of the cancellation led to a transitory increase in birth rates just before the benefit termination was implemented, driven by a short-term decrease in abortions. The actual cancellation of the policy led to a 6% decline in birth rates.

Incentives in child-related benefits may also lead to unexpected outcomes. In the context of established parental leave schemes, Andersen et al. (2018) assessed the relationship between cash transfers and fertility in the case of a cash-for-care policy introduced in Norway in 1998. The authors compared the subsequent fertility behavior of eligible and ineligible mothers over a four-year period and found that the eligible mothers had a slower progression to second births and lower short-term fertility.

Another line of research has focused on the effect of income on fertility in general. For example, Cowan & Douds (2022) analyzed the effects of the Alaska Permanent Fund Dividend that has provided all Alaskan residents with a substantial annual cash payment since 1982. They examined the effects of the cash transfer on fertility among a large and

diverse population receiving varying amounts of cash payments over time and found that the payments increased short-term fertility rates, particularly among socioeconomically disadvantaged populations. Their results indicated that receiving additional income may remove economic constraints to having a child. Other studies have utilized lottery winners as quasi-experimental samples to study the effects of unearned income on fertility (e.g., Bleakley & Ferrie 2016; Bulman et al. 2022; Cesarini et al. 2023; Tsai et al. 2022). Consistent with economic models that take children as goods (e.g., Becker 1960), these studies document small but positive effects of wealth on fertility.

Some evidence on the effects of tax programs aiming to provide a guaranteed income has been available from the experiments testing a negative income tax system (NIT) in the US and Canada in the 1970s. In the Gary Income Maintenance Experiment, having an income guarantee decreased fertility (Salkind & Haskins 1982), while in the Manitoba Basic Annual Income Experiment the guaranteed income had a positive effect on childbearing (Dökmeci et al. 2023). Overall, studies on NIT experiments have found no impact on fertility (Marinescu 2018). More recent studies have utilized changes in the earned income tax credit system (EITC) in the US as a quasi-experimental setup to study the fertility effects of taxation. According to available studies (e.g., Hoynes et al. 2015), EITC expansions in the US during the 1990s did not affect overall fertility. Small, if any, reductions have been documented in the higher order (three or more children) birth rates for White women in cases where expansions were targeted to families with children (Baughman & Dicker-Conlin 2009). Other studies on EITC expansions (Duchovny 2001) and on comparable tax reforms in other countries (e.g., for Spain, Azmat & González 2010) have found similar results.

To conclude, the broader literature documents that the fertility elasticities with respect to cash transfers from income support programs are generally small (Moffitt 1998). However, previous theoretical and empirical literature supports the expectation that cash transfers tied

to childbearing, parental leaves, and the presence and number of children may lead to increases in fertility (see also Ang 2015; Riphahn & Wiynk 2017). On the other hand, economic reasoning suggests that the work-inducing aspect of earnings credits and supplements could lead to reductions in fertility due to an increase in the opportunity cost of the mother's time. Previous empirical studies have not found strong evidence on the presence of the latter mechanism in childbearing decisions, but one may debate if the earlier studies have really been able to test the hypothesis in a controlled fashion. The Finnish basic income experiment creates a unique opportunity to contribute to the research and to test how changes in cash incentives may affect fertility among low-income women in high income countries.

The Finnish Basic Income Experiment

The main objective of the Finnish basic income experiment was to increase the employment of persons receiving basic unemployment benefits by providing them an additional temporary cash transfer program. The policy provided the participants with a guaranteed level of income and significantly higher cash incentives for work relative to unemployment when compared to the mainstream tax-benefit system. The experiment ran for two years from January 2017 to December 2018, taking place within the otherwise unaffected Finnish tax-benefit and social service system that represents an extensive Nordic welfare state.

The Finnish experiment provided an unconditional monthly cash payment, a basic income, to the participating individuals for up to two years. In addition to providing a minimum level of income without conditions, the policy served as a significant earnings supplement during the experiment. In the experiment, the point of comparison is the mainstream welfare system, which provides income insurance for unemployment, sickness, parenthood, and retirement as well as additional cash assistance on the basis of means-testing.

Persons aged 25–58 who received basic unemployment benefits in November 2016 were eligible for the experiment (target population). After applying specific exclusion criteria[1], the total target population of the experiment added up to 175,222 persons. The experiment was designed as a randomized controlled trial. To assess the effects of the basic income policy, primarily on economic behavior, 2,000 persons who previously received basic unemployment benefits were assigned at random to a treatment group that was eligible for the basic income payments. The rest of the target population served as the control group. Persons in the target population had relatively low incomes and a relatively difficult position in the labor market: on average, they received €1,900 in earnings and were paid unemployment benefits for 286 days in 2016, nearly 80% of them had completed secondary education at the most, and 16% had reported incapacity for work at the employment services (Verho et al. 2022).

The treatment group was paid an unconditional cash transfer of €560 on the second business day of each month. The amount was about equal to the net amount of minimum unemployment benefits and minimum parental and sickness allowances. The amount was deducted from other social benefits (e.g., unemployment benefits, parental allowance, or sickness allowance) paid for the same time period and considered as benefit income when calculating potential housing support and social assistance of the receiving household. The basic income payments disregarded any other income or assets of the participant or any member of their household.

The payments were non-taxable and no income or means-testing was applied. In addition, the personal income tax schedule remained the same for the treatment group and control group. This led to much higher work incentives in the treatment group than in the control group. For

[1] Persons were excluded if they, most importantly, were laid off, received child home care allowance, received pension, or lived outside Finland at the time of defining the target population (Finland 2016).

those earning up to, for example, €2,000 per month from work and not receiving any means-tested benefits, a basic income would have increased incomes before taxes and work-related expenses by a third. A microsimulation analysis that considers the actual recipiency of means-tested benefits and the study subjects' spouses' income estimated that, with monthly earnings of €2,000, the net income of the participating household would have increased by almost one fourth, on average (Hämäläinen et al. 2020). For those who were eligible for unemployment benefits or other basic social benefits and who had no earnings, being in the basic income group mostly meant getting part of their benefit income more regularly than in the control group.

Persons in the basic income group continued to be eligible for all benefits for families with children with the same criteria as the control group, i.e., there were no changes made to maternity grants, child benefits, or child maintenance allowances. If the person received maternity/parental leave benefits, then basic income payments were deducted from the other benefits paid for the overlapping period. If the person received child home care allowance, the basic income payments were cancelled for the overlapping period.

The treatment group received the basic income payments for up to two years, as long as they did not move abroad for more than 30 days, get imprisoned, or start receiving a pension. The control group never received the basic income but continued to receive basic social benefits and welfare according to the usual eligibility rules. The experimental analysis of the experiment requires that the entire treatment group is compared with the control group (i.e., following intention-to-treat strategy) because these are the two groups that were randomly assigned and were, therefore, nearly identical in their observed and unobserved characteristics, except that one group was eligible for the basic income scheme.

Theoretical Framework and the Study Hypotheses

The primary aim of the empirical part of the study is to examine (I) the average treatment effect[2] of the Finnish basic income experiment on the participating women's probability of giving birth. The outcome is defined as having at least one child during the follow-up period that extends to a maximum of 40 months from the beginning of the experiment. The measurement period starts in the beginning of the ninth month from the initiation of the experiment. Persons in the treatment group received information on being part of the experiment right before the experiment started, so births the ninth month should not be affected by the experiment. Based on economic reasoning about the financial costs of having children (e.g., Becker 1981), one could expect that improvements in financial circumstances, i.e., a guaranteed income for all and an additional income for those who found a job during the experiment, would have a positive effect on fertility. However, a closer look at the changes in the cash incentive structures imposed by the Finnish experiment gives reasons to expect that also an opposing causal mechanism may be present.

Cash Incentives Changed Among Female Basic Income Recipients

In the experiment, basic income payments provided a regular minimum level of income for the participants without conditions. However, the basic income payments also served as relatively generous monthly earnings supplements. The experiment increased work incentives significantly, leading to an increase of nearly 25% in the household disposable income if the participants' monthly earnings were €2,000. On the other hand, as the basic income payments

[2] The average treatment effect is interpreted as the difference in the probability of having a child that would be observed if everyone in the study population were in the basic income group versus if everyone in the study population were in the mainstream tax-benefit system, i.e., equivalent to the average of all individual risk differences under the two systems.

were deducted from other social benefits, there were no similar increases in the participants' benefit incomes. For example, family benefits were basically not affected by the experiment, except the payment days were slightly changed compared to the mainstream system. The changes in cash incentives increased the attractiveness of employment relative to unemployment and also relative to childbearing. Moreover, the gains from the program were available for only a limited period known by the participants, creating an additional incentive to postpone having a child.

Findings from the main evaluation study support the presence of the hypothesized causal mechanism: During the second year of the experiment, positive effects on employment were found (Hämäläinen et al. 2020). Persons in the treatment group worked more than persons in the control group, measured both in the share of persons having employment days during a month and in the average number of days in employment: During the first year, the employment rate increased from 8% to 18% in both study groups, but the estimated employment effect was not statistically significant. During the second year, the employment rate increased to 27% in the treatment group and to 25% in the control group, and the estimated employment effect was 6.6 days (8.6%). Among women, the estimated employment effect for the period from November 2017 to October 2018 was 5.9 days, but the estimate was not statistically significant.

The experiment also increased incentives to some activities outside the labor force. Basic income payments were higher than the study grant, and they did not reduce the maximum number of available student grant months. Therefore, the basic income payments increased the incentives for getting an education during the experiment. Other possible activities that compete with childbearing include participating in volunteer or any unpaid work full-time. In the basic income group, persons faced no behavioral requirements in order to receive a basic

income, which may have opened up new financial opportunities to otherwise unavailable life choices.

The magnitude of the potential negative effect of the change in the cash incentives may be hypothesized to be age-dependent. Older women have a higher risk of not being able to get pregnant, and thus, the expected cost of postponing childbearing may be larger for them (Schmidt et al. 2012). Moreover, the variation of the effect along immigration background is of interest because immigrant women may follow different childbearing and labor participation patterns than the native population. Finally, decision-making regarding having the first and subsequent children may follow different logics, motivating subgroup analyses for women with and without dependent children.

Household Income Changed Among Women Whose Spouses Received Basic Income

To complement the primary aim of the study, the secondary aim is to analyze (II) the average treatment effect of the Finnish basic income experiment on the probability of giving birth among women whose spouses participated in the experiment. For these women, the experiment induced an increase in their total household income if their participating spouses found a job during the experiment. However, these women were not exposed to increased work incentives or incentives to other activities competing with childbearing because they were not personally eligible for the basic income. Taking women whose spouses received basic income as a separate study population provides an interesting point of comparison for the main analysis, as they offer a setting similar to studies analyzing the fertility effects of unearned income (e.g., Bleakley & Ferrie 2016; Bulman et al. 2022; Cesarini et al. 2023; Cowan & Douds 2022; Tsai et al. 2022). Based on the arguments presented in this section, Table 1 summarizes the study questions, assumed causal mechanisms, and empirical hypotheses of the study regarding the potential fertility effects of the Finnish basic income experiment.

Table 1 Summary of the study questions and hypotheses

Study question	Causal mechanisms	Empirical hypotheses
How the Finnish basic income experiment affected childbearing among **female participants**	Female participants respond to a temporary earnings opportunity (or other opportunity competing with childbearing) by **postponing** childbearing	A **negative** effect on the cumulative probability of having a child during the experiment that levels off after the experiment
	Increased personal income and financial security (resulting both from increased employment and recipiency of basic income scheme) **compensate** for the costs of having a child	A lasting **positive** effect on the probability of having a child after the experiment (anticipation and level-effect)
How the Finnish basic income experiment affected childbearing among **women whose spouses participate in the experiment**	Increased household income and financial security (resulting both from increased employment and recipiency of basic income scheme) **compensate** for the costs of having a child	A lasting **positive** effect on the probability of having a child during and after the experiment (anticipation and level-effect)

Data

In the study, administrative registers were used to collect individual-level data before the time of random assignment as well as during and after the experimentation period. The original target population of the Finnish basic income experiment included 175,222 persons, i.e., almost all persons who received basic unemployment benefits in November 2016. To set up the experiment, 2,000 persons from the target population were allocated to the treatment group and 173,222 to the control group. As the primary aim of the study was to examine (I) the average treatment effect of the Finnish basic income experiment on the participating women's probability of giving birth, a further inclusion criterion was implemented: only women aged below 44 in the beginning of the experiment were selected from the original study groups. The exclusion of men and older age groups resulted in a study population comprising 590 women in the treatment group and 51,927 women in the control group.

The outcome variable of the study, i.e., the time of having a child, was derived from the Benefit Register of the Social Insurance Institution by collecting information on children's birth dates from the records of maternity grants received by the study subjects. A maternity grant that can be taken as a maternity package or a tax-free lump sum of €170 is claimed each time a woman has a new child.

Every person in the study population was followed from the registers starting from the treatment assignment in December 2016 until the end of the available data. Data on maternity grants extend to February 2020 and, in practice, include information on births until April 2020, i.e., 40 months from the beginning of the experiment. With these data, a monthly indicator of having a child during the 40-month follow-up period was constructed. For the indicator, multiple-births were calculated as single events, i.e., a study subject can have only one birth per month.

In addition to the main study outcome, information on several baseline characteristics (measured prior to the experimentation period) including allocation to the treatment group, age, marital status, cohabitation, number of dependent children, native language, place of residence, and taxable income were collected from the Basic Income Experiment Register, Benefit Register of the Social Insurance Institution, and Tax Register. Treatment status indicates the study group to which the study person belongs, i.e., the basic income group or the control group. Marital status is categorized as never married, married, divorced, or widowed, and same information is included for registered partnerships (same-sex couples). Cohabitation is defined as cohabiting without marriage, and dependent children are defined as 0–17-year-old children of a legal guardian[3]. Native language is defined as a person's officially registered first language. Place of residence is categorized into municipality groups (urban, semi-urban, rural) according to the municipality's degree of urbanization, i.e., according to the proportion of population living in urban settlements and the size of the population in the largest urban settlement in 2016 (Statistics Finland 2015). Taxable income measures the total annual earned and capital income (including benefits) before tax

[3] Information on dependent children is used as a proxy of having had previous children during a longer time period. Because of the legal base, the proxy does not exactly measure the number of biological or adopted children which is not as such available in the data.

deductions. The original source for demographic variables in the Benefit Register of the Social Insurance Institution (age, marital status, native language, and the place of residence) is Population Register. The baseline variables are used to describe the study population and to divide it into subgroups for the analysis of effect heterogeneity.

For the secondary aim of the study, i.e., to analyze (II) the average treatment effect of the Finnish basic income experiment on the probability of giving birth among women whose spouses participated in the experiment, an additional study population was formed, and the same outcome and background variables were collected when available. The additional study population includes 20–44-year-old women who had a spouse in the target population of the Finnish basic income experiment right before the experiment started. Spouses are defined as spouses in marriage or registered partners as recorded in the Population Register data in December 2016, or as spouses in the General Housing Allowance Register (i.e., cohabiting partners). The additional study population included 152 women in the treatment group and 12,706 in the control group.

Descriptive Statistics

The baseline characteristics of the persons in the treatment and control groups of the main study population are presented in Table 2. At baseline, about two fifths were married or in a registered partnership, almost as many had never been married, and about 15% of the women were cohabiting. About two fifths had no dependent children. Every third woman had other than Finnish or Swedish (official domestic languages in Finland) as their native language, and about four fifths of the persons in the study population lived in urban municipalities. Average taxable income during the year preceding the experiment was around €11,000 in both of the study groups.

Table 2 Baseline characteristics in the basic income group and control group

Baseline characteristic	Basic income group	Control group	Sig.
Age			
25–29 years (%)	24.1	27.4	†
30–34 years (%)	29.2	27.4	
35–39 years (%)	25.1	24.3	
40–44 years (%)	21.7	21.0	
Marital status			
Never married (%)	43.1	41.6	
Married[a] (%)	42.9	42.3	
Divorced or widowed (%)	11.4	13.4	
No information (%)	2.7	2.7	
Cohabiting (%)	15.1	15.2	
Number of dependent child (%)			
No children (%)	39.0	38.3	
One child (%)	21.5	21.9	
Two children (%)	23.1	22.3	
Three or more children (%)	16.4	17.4	
Foreign language (%)	30.7	32.3	
Municipality group			
Urban (%)	81.5	80.4	
Semi-urban (%)	10.8	10.6	
Rural (%)	7.1	8.7	
No information (%)	0.5	0.3	
Taxable income[b] (€)	11,024	11,035	
N	590	51,927	

Notes: Two-tailed t-test applied to differences between the background characteristics of basic income and control group. Age, marital status, native language, and municipality group on Dec 31, 2016. Cohabitation and number of dependent children in Nov 2016.

[a] Including persons in registered partnership.

[b] Average taxable income (earnings, capital income and taxable social benefits) for the entire year 2016.

†$p < .10$

Table 2 shows that the random allocation produced study groups of women that were mostly similar in their examined background characteristics. Statistically significant differences were found between the treatment and control group for one of the examined background characteristics: The treated were less likely to be 25–29 years old than the controls at 10% significance level. The found difference between the research groups must have resulted by chance. In order to adjust for the small differences in the background characteristics between the research groups, age and a number of other baseline covariates that predict fertility are included in the additional estimations provided in the Supplement.

The baseline characteristics of the persons in the treatment and control groups of the additional study population, i.e., the women affected via their participating spouses, are presented in Table 3. The additional study population is somewhat different compared to the

study population of the main analysis. The additional study population also includes 20–24-year-old women. At baseline, almost 70% were married or in a registered partnership, and the rest of the women were cohabiting. Half of the women had other than an official domestic language as their native language, and almost 90% of the persons in the study population lived in urban municipalities.

Table 3 Baseline characteristics of the women whose spouses belonged to the target population of the Finnish basic income experiment, separately for basic income group and control group

Baseline characteristic	Basic income group	Control group	Sig.
Age			
20–24 years (%)	13.8	10.9	
25–29 years (%)	25.0	26.0	
30–34 years (%)	21.1	26.5	
35–39 years (%)	23.0	21.3	
40–44 years (%)	17.1	15.4	
Marital status			
Never married (%)	23.7	27.0	
Married[a] (%)	69.7	67.0	
Divorced or widowed (%)	5.9	4.4	
No information (%)	0.7	1.6	
Cohabiting (%)	30.3	33.0	
Foreign language (%)	54.6	45.0	*
Municipality group			
Urban (%)	87.5	87.0	
Semi-urban (%)	5.9	7.3	
Rural (%)	5.9	5.5	
No information (%)	0.7	0.2	
N	152	12,706	

Notes: Two-tailed t-test applied to differences between the background characteristics of basic income and control group. Age, marital status, native language, and municipality group on Dec 31, 2016. Cohabitation in Dec 2016.

[a] Including persons in registered partnership.

*$p < .05$

The random allocation produced study groups of women that were mostly similar in their examined background characteristics, except that the treated in the additional study population were more likely to have other than Finnish or Swedish as their native language compared to the controls (significant at 5% significance level).

To enable causal inference about the average treatment effect of the intervention, the original experimental design of the Finnish basic income experiment is exploited. The fertility outcomes of women in the entire treatment group are compared to those in the control group, both among women in the target population and among women whose spouses were in the

target population of the experiment. Because persons in the target population of the experiment were assigned to the treatment group or to the control group at random, the groups are similar both in their observed and unobserved characteristics, such as preferences and motivations. Thus, any differences in the probability of having children between the study groups can be attributed to the intervention. Being in a basic income system or in the mainstream tax-benefit system is the only characteristic that differs systematically between the study groups.

Estimation Method

In the main analysis of the study, the average treatment effect of being selected into the basic income system for two years on fertility outcomes was estimated using the following linear regression equation and the Ordinary Least Squares estimator: $Y_i = a + b \times T_i + \text{Sum}(c_k \times X_k) + e_i$, where i is a unique person in the study, Y is the dependent variable, such as having a child during a specific follow-up period, T is the indicator of the person being assigned to the treatment group, X_k is the k^{th} baseline characteristic included as a control variable, and e is the normally distributed error term. Coefficient b represents the effect of being selected into the basic income system for two years on the dependent variable, and c_k is the average contribution of the k^{th} baseline covariate on the dependent variable. Estimations in the Results section are based on a simple linear regression equation that includes only the treatment indicator as a predictor. Estimations based on multiple linear regression equations including age and other covariates as predictors are reported in the Supplement. Statistical inference is conducted using two-tailed t-test and setting the null hypothesis to no effect. The results are tested to be consistent with the results derived by using logistic regression or time-to-event analysis.

The main analysis is performed by estimating the regression model above separately for the following outcome variables: having at least one birth between month 9 and (I) month 16, (II) month 24 (the end of the experimentation period, (III) month 32, and (IV) month 40 (the end of the follow-up). Since the groups are assigned randomly and the fertility outcome results from the decision to conceive post-assignment, births are calculated from the ninth month onwards. This approach ensures that the conception occurs after the individuals were allocated to the treatment group. In addition to the main analysis, an examination of effect heterogeneity is conducted for the four follow-up periods (I, II, IIII, and IV) by estimating the average treatment effect separately for subgroups formed according to age, having dependent children, native language, and urbanization level of the municipality of residence.

Results: Fertility Effects of the Finnish Basic Income Experiment

Effects on Female Basic Income Recipients

Calculation of births during the 40-month follow-up starting from the beginning of the experiment resulted in 80 births for 72 women giving birth in the treatment group (N=590) and 8,360 births for 7,560 women giving birth in the control group (N=51,927). Figure 1 shows the cumulative share of persons in the study population having at least one birth after the initiation of the experiment, month by month and separately for the basic income group and control group. During the first eight follow-up months of the experiment, no lasting difference in the cumulative share of persons having at least one birth is observed. After month 9, a gradually increasing difference between the groups emerges, resulting in a smaller cumulative share of women in the treatment group having at least one birth after treatment assignment than in the control group. The difference does not diminish after the experimentation period ends; instead, it lasts and even increases a bit throughout the rest of the follow-up period from month 24 to month 40.

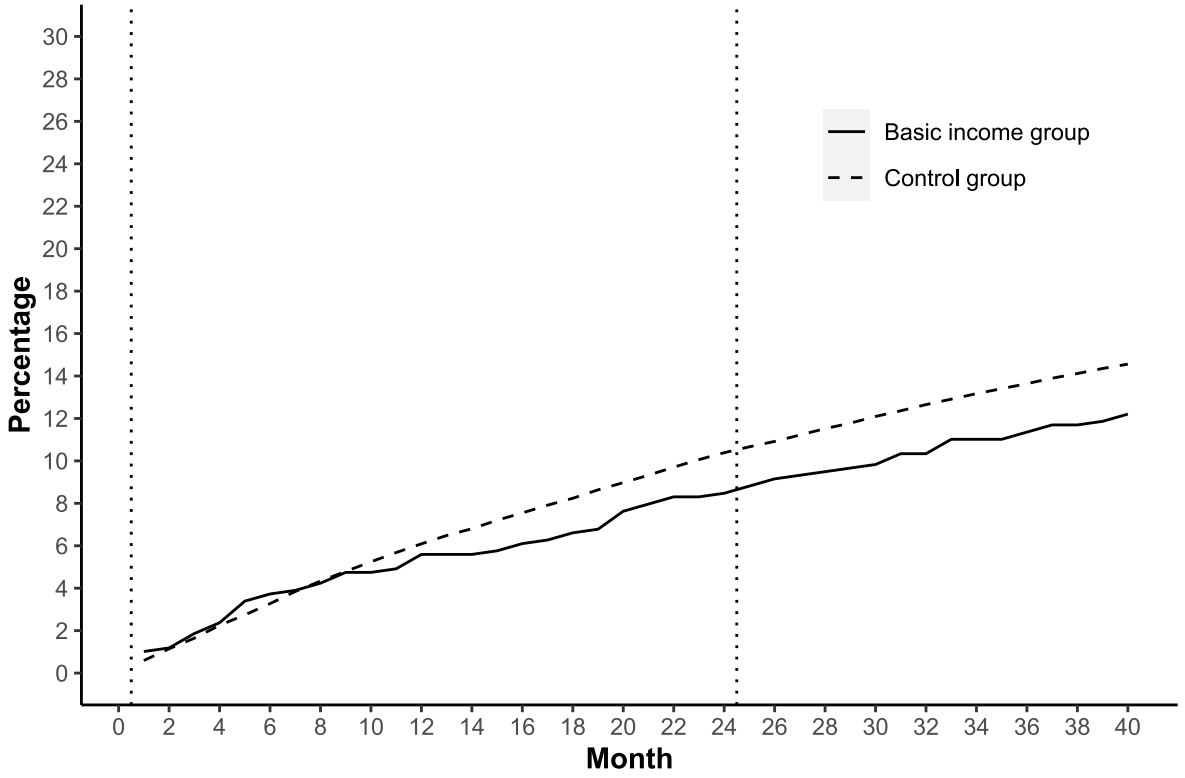

Figure 1 Cumulative share of women who had at least one child after the initiation of the experiment, separately for basic income group and control group; months 1–40

Table 4 summarizes the average treatment effect of the intervention on having at least one birth between month 9 and month 16, 24 (the end of the experiment), 32, and 40 (the end of the follow-up). By month 16, 3.3% of the persons in the control group had given birth to a child. In the treatment group, the cumulative share is 1.4 percentage points (47.7%) lower, and the difference is statistically significant at 10% significance level. At the end of the experiment (month 24), about 6.4% of the persons in the control group had given birth to a child, while in the treatment group, the cumulative share is 1.6 percentage points (25.5%) lower, but the difference is not statistically significant. At the end of the follow-up (month 40), about 11.1% of the persons in the control group had given birth to at least one child, and the estimated effect of the experiment is -2.0 percentage points (-17.6%), but not statistically significant.

About 10.4% of the persons in the control group and 8.6% in the treatment group had one birth, and about 0.8% of the persons in the control group and 0.5% in the treatment group had two or more births during the entire follow-up period from month 9 to month 40. A non-experimental comparison of the study groups shows that women in the control group who had a birth during the follow-up period (months 9–40) had it, on average, 23.1 months after the beginning of the experiment, while the women in the treatment group had a birth 1.1 months later, on average. The difference in the average month of having a birth is not statistically significant at 10% significance level.

Table 4 Effect of basic income on childbearing among low-income women; mean probability in the control group and absolute and relative difference with basic income during the follow-up

Outcomes	Mean probability in control group	Risk difference with basic income	Risk ratio with basic income	Sig.
At least one birth since month 9				
By month 16	.033	-.014	0.573	†
By month 24	.064	-.016	0.745	
By month 32	.089	-.018	0.798	
By month 40	.111	-.020	0.824	

Notes: Two-tailed t-test applied to differences between the means of outcomes of basic income group and control group. Null hypothesis is $P(Y=1)_{treat}=P(Y=1)_{control}$.
†$p < .10$

Table 5 reports the average treatment effects of the experiment during and at the end of the experiment among different subgroups of the study population, i.e., according to age, having or not having dependent children, native language, and municipality group. All effect estimates are negative, except for the 40–44-year-olds at month 16, 30–34-year-olds at month 24, and for those without dependent children at month 24. The positive effect estimates are not statistically significant, and their magnitude is in substantial terms zero (0.2 percentage points, 0.5 percentage points, and 0.6 percentage points, respectively).

Between age groups, the largest absolute effect magnitudes are estimated for the youngest age group (25–29-year-old women): -2.8 percentage points at month 16 (not statistically significant) and -4.2 percentage points at month 24 (statistically significant at 10%

significance level). Persons with dependent children are more responsive than persons without dependent children.

For example, among women with children, the probability of having given birth by the end of the experiment was 3.0 percentage points lower in the treatment group than in the control group (statistically significant at 5% significance level). Among women with no children, we found basically no difference between the study groups. Regarding the women's native language, we find no variation in the effect estimates at month 16. However, at the end of the experiment, we find a negative effect of -2 percentage points (statistically significant at 10% significance level) for those speaking Finnish or Swedish as their native language, and substantially no effect for those speaking a foreign language. Finally, persons residing in semi-urban or rural areas stand out as having a large negative effect of -5.2 percentage points (statistically significant at 5% significance level) at the end of the experiment.

Table 5 Effect of basic income on childbearing among subgroups of low-income women; mean probability in the control group and absolute difference with basic income during and at the end of the experiment

	Months 9–16			Months 9–24			
Baseline subgroup	C	Diff.	Sig.	C	Diff.	Sig.	N of treated
Age							
25–29 years	.049	-.028		.099	-.042	†	142
30–34 years	.041	-.006		.082	.005		172
35–39 years	.026	-.020		.049	-.022		148
40–44 years	.006	.002		.011	-.003		128
Having dependent children							
Yes	.035	-.017	†	.069	-.030	*	360
No	.029	-.006		.055	.006		230
Native language							
Domestic	.025	-.013	†	.049	-.020	†	409
Foreign	.048	-.014		.094	-.005		181
Municipality group[a]							
Urban	.033	-.012		.064	-.008		481
Semi-urban–rural	.030	-.021		.062	-.052	*	106

Notes: Two-tailed t-test applied to differences between the means of outcomes of basic income group and control group. Null hypothesis is $P(Y=1)_{treat}=P(Y=1)_{control}$.
[a] Persons with no information on municipality group are excluded.
†$p < .10$; *$p < .05$

The analysis of effect heterogeneity suggests that 25–29-year-old women were more responsive to the intervention than 30–34-year-old women. In addition, women who had dependent children were responsive, but those without dependent children were not. This

observation resonates with the main evaluation study of the experiment that documents the largest variation in the employment effect between different family types (Verho et al. 2022). Similarly, women whose native language was one of the domestic languages were responsive, while those speaking some other language were not. Effect estimates among older age groups and among those living in semi-urban or rural areas are quite unprecise and unstable, as they are based on a lower number of observations both in terms of persons and births.

Effects on Women Whose Spouses Received Basic Income

For women whose spouses received basic income, calculation of births during the 40-month follow-up resulted in 54 births for 45 women giving birth in the treatment group (N=152) and 3,707 births for 3,297 women giving birth in the control group (N=12,706). Figure 2 shows that during the first eight follow-up months, no lasting difference in the cumulative share of persons having at least one birth is observed. At month 9, a gradually increasing difference between the groups emerges, resulting in a larger cumulative share of women in the treatment group having at least one birth after treatment assignment compared to women in the control group, and the difference lasts and even increases throughout the rest of the follow-up period.

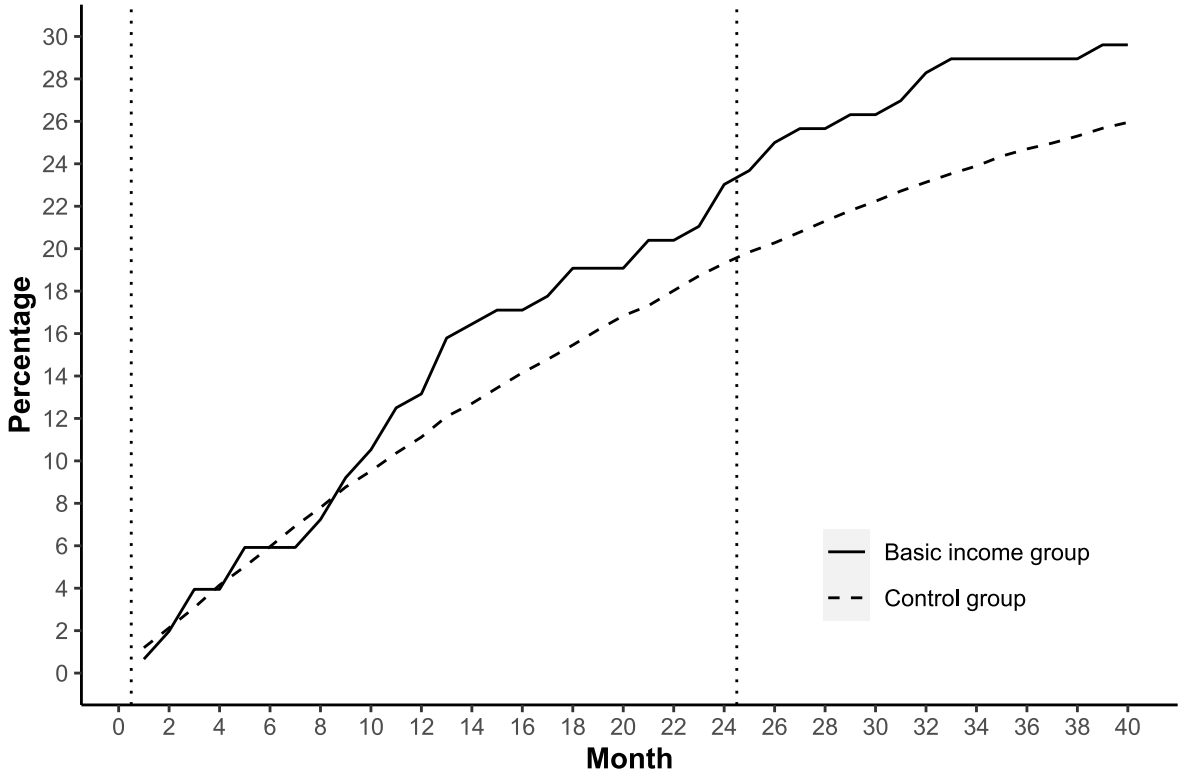

Figure 2 Cumulative share of women who had at least one child after the initiation of the experiment; 20–44-year-old women with a spouse in the target population of the experiment, separately for basic income group and control group; months 1–40

Table 6 summarizes the average treatment effect of the intervention on having at least one birth among women whose spouses received basic income. The effects are shown per follow-up period. By month 16, 6.5% of the persons in the control group had given birth to a child. In the treatment group, the cumulative share is 3.4 percentage points (52.9%) higher, and the difference is statistically significant at 10% significance level. At the end of the experiment (month 24), about 12.3% of the persons in the control group had given birth to a child, while in the treatment group, the cumulative share is 4.8 percentage points (39.3%) higher (statistically significant at 10% significance level). At the end of the follow-up (month 40), about 20.0% of the persons in the control group had given birth to at least one child, and the estimated effect of the experiment is 5.0 percentage points (25.0%) but not statistically significant.

Table 6 Effect of basic income on childbearing among women who have a spouse in the target population of the Finnish basic income experiment; mean probability in the control group and absolute and relative difference with basic income during the follow-up periods

Outcomes	Mean probability in control group	Risk difference with basic income	Risk ratio with basic income	Sig.
At least one birth since month 9				
By month 16	.065	.034	1.529	†
By month 24	.123	.048	1.393	†
By month 32	.167	.064	1.382	*
By month 40	.200	.050	1.250	

Notes: Two-tailed t-test applied to differences between the means of outcomes of basic income group and control group. Null hypothesis is $P(Y=1)_{treat}=P(Y=1)_{control}$.
†$p < .10$; *$p < .05$

Discussion and Conclusions

The results suggest that temporarily increasing cash returns from employment and other activities may have a negative effect on the probability of giving birth among low-income women. The study found that the Finnish basic income experiment, which provided additional income for the employed, students, and persons active outside the labor force but not for persons having a child, had a statistically significant (at 10% significance level) effect of -1.4 percentage points (-62.7%) on the probability of giving birth during the two-year experiment. The cumulative share of persons having a birth in the treatment group compared to the control group diverged 10 months after the beginning of the experiment which is consistent with the assumption that births before the ninth month of the experiment should not be affected by the experiment. The cumulative share of persons having at least on child since month nine remained lower in the treatment group throughout the entire follow-up period of 40 months (statistically significant at 10% significance level from month 14 to month 19).

According to the results, 25–29-year-old women were more responsive to the intervention than 30–34-years-old women. This finding is in line with the fact that the risk of not being able to have a child increases with age. However, surprisingly, women aged 35–39 had an

equally large relative effect estimate on the probability of giving birth during the experiment as the youngest age group.

The findings suggest that temporary cash transfer programs that incentivize other activities in relation to childbearing may indeed decrease fertility among low-income women, at least in the short term. The findings support the expectation that, in some cases, the work-inducing aspect of earnings credits and supplements may lead to reductions in fertility due to an increase in the opportunity cost of the mother's time (e.g., Hoynes et al. 2015; Willis 1973). The same causal mechanism may also play a role in policy reforms that increase cash incentives for any activities that compete with childbearing. Even if fertility elasticities with respect to cash transfer reforms may be generally small (Moffitt 1998), optimization regarding the time of having a child and earnings opportunities seem to matter, as also documented by, e.g., Azmat & González (2010) in the context of the introduction and cancellation of a child benefit policy in Spain.

Contrasting with the effect of changes in cash incentives, an additional analysis of women whose spouses received the basic income found a positive effect of 4.8 percentage points (39.3%) on the probability of giving birth during the experiment (statistically significant at 10% significance level). The finding indicates that a pure improvement in household financial circumstances may increase fertility by compensating for the costs of having a child, as found by studies on the effects of unearned income (e.g., Bleakley & Ferrie 2016; Bulman et al. 2022; Cesarini et al. 2023; Cowan & Douds 2022; Tsai et al. 2022) and expected by economic models of fertility (e.g., Becker 1960).

A further study could evaluate the long-term fertility effects of the Finnish basic income experiment, and the effects may be quite different. For example, preferring employment to childbearing in the short run may increase a person's economic buffers against losses of earnings due to childbearing later. By lowering the potential economic obstacle of having a

child, this causal chain could eventually lead to a positive overall fertility effect. In addition, previous studies have indicated that unemployment and job insecurities may decrease fertility, while employment may increase fertility, especially in the case of having the first child (e.g., Alderotti et al. 2021; Del Bono et al. 2012; Hofman et al. 2017; Huttunen & Kellokumpu 2016; Kreyenfeld & Andersson 2014). So far, the findings are in contrast with the aforementioned studies and the original empirical hypothesis: The significant increase in income during the experiment and the slight increase in employment during the second year did not bring back the cumulative share of women giving birth in the treatment group to the level of the control group (or above that) even during the 16 months after the experimentation period.

Effects of a temporary experiment may also be quite different compared to a permanent work incentive policy that provides earnings supplements also after giving birth and the temporary period of caring for a small child at home and, thus, induces smaller incentives for postponement. After all, previous studies on permanent earnings credit system reforms have not been able to find statistically significant negative effects on fertility. Interestingly, the findings of this study show that temporary nature and timing of policy programs may indeed offer a powerful policy tool to effectively direct social behavior.

In the study, the estimated effect of incentives may be partly distorted because of other affecting mechanisms. First, the experiment increased the incomes of the participants who found jobs during the experiment independent of any employment effects. Second, most of the participants received higher benefit incomes on the first month of the experiment because both basic income payments for January 2017 and unemployment benefits for the end of the year 2016 were paid then. Third, the experiment provided all participants improved financial security in the form of an unconditional guaranteed income. Based on previous research on fertility effects of unearned income (e.g., Cesarini et al. 2023; Cowan & Douds 2022), one

could expect that these exogenous increases in financial resources would have a positive effect on fertility. If that were the case in the Finnish experiment, the results of this study underestimate the magnitude of the true negative effect of the cash incentives.

In some cases, taking care of a child at home may have led to higher benefit incomes in the basic income group than in the control group. For some participants, the amount of basic income may have been higher than the amount of home care allowance that they would have received if they had been in the control group. In addition, for those receiving parental benefits while working part-time, the basic income system may have also provided higher incomes than the mainstream tax-benefit system. Finally, persons in the treatment group had a chance to postpone their parental allowances to extend their publicly supported period of caring for a newborn. These particularities may have increased incentives to have a child in the treatment group relative to the control group, leading again to the underestimation of the magnitude of the negative effect of the cash incentives, even though the potential number of persons affected is likely very small.

Moving abroad may also create bias in the effect estimates. In general, if persons move abroad from Finland for longer than six months, they are transferred to the other country's social security system and are no longer eligible for maternity grants. In the study, this process would have led to missing data on births for the moving persons. However, persons in the treatment group had increased incentives to stay in Finland, as they would have otherwise lost their basic income payments. Thus, it is reasonable to expect that controls were more likely to move abroad than the treated. As a result, the controls would have been less likely to have records for maternity grants and recorded births, leading again to the underestimation of the magnitude of negative fertility effect of being selected into a temporary basic income program.

Potential explanations for negative fertility effects include competing activities, such as employment, but also other activities outside labor force. In the Finnish basic income experiment, basic income payments were higher than the student grant, and they did not reduce the maximum number of student grant months available for the participants. This change increased incentives to train and educate oneself during the experiment and perhaps created another competing activity for childbearing. In the experiment, participants faced no behavioral requirements if they did not claim for the mainstream benefits and instead decided to cope with the basic income payments. This may have opened up new financial opportunities for short-time life choices that compete with the choice of having a child.

To conclude, income and cash incentives seem to play a notable role in the fertility decisions of low-income women, and, thus, potential fertility effects are worth considering when reforming cash transfer policies. As Andersen et al. (2018) point out, policy changes may be associated with changes in fertility behavior, produced by the changes in the complex incentive structures. These structures are determined both by the individual policy (here, especially the temporary nature of the experiment) and the wider policy framework (here, the parental benefit system that remains mostly unaffected by the reform). For example, increasing returns from work in relation to returns from unemployment by introducing temporary earnings supplements may lead to undesired fertility outcomes if no parallel reforms are made to parental benefits. On the other hand, individually targeted policies may affect the behavior of other household members asymmetrically–making the task of designing policies with intended outcomes even more complicated. The findings of the study are societally relevant, especially in countries and times faced with declining fertility rates and increasing age dependency ratios.

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Supplement

Adjusted Effect Estimates

Table S1 Effect of basic income on childbearing among low-income women; unadjusted and adjusted absolute difference in the mean probability with basic income

Outcome	Un adjusted risk difference with basic income	Sig.	Adjusted to age only[a]	Sig.	Adjusted to age and other covariates[b]	Sig.
At least one birth since months 9						
By month 16	-.014	†	-.013	†	-.013	†
By month 24	-.016		-.013	†	-.014	
By month 32	-.018		-.016		-.015	
By month 40	-.020		-.017		-.015	

Notes: Two-tailed t-test applied to differences between the means of outcomes of basic income group and control group. Null hypothesis is $P(Y=1)_{treat}=P(Y=1)_{control}$.

[a] Binary control variables for 5-year age groups (25–29/30–34/35–39/40–44) at baseline.

[b] Binary control variables for 5-year age groups, native language (foreign/domestic), number of dependent children (0/1/2/3 or more), marital status (married/other), and cohabitation at baseline.

†$p < .10$

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