The Impact on Mental Health of Relaxing Fertility Restrictions: Evidence from China's Universal Two-Child Policy

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Abstract

Reproductive autonomy is essential to people's well-being. However, despite widespread restrictions on reproductive autonomy around the world, the effects of relaxing such restrictions on mental health have long been insufficiently studied and remain undetermined. This paper explores the causal relationship between relaxing fertility restrictions and mental health by using the implementation of China's universal two-child policy (UTCP) as a natural experiment. By adopting the difference-in-differences method and comparing cohorts that were differentially exposed to the UTCP, this paper presents the first empirical evidence that this fertility-restriction relaxation has led to significant improvements in the mental health of the general population, as evidenced by reductions in severe mental health issues and enhancements in overall health status. This paper further investigates the impacts of such relaxations on the mental health outcomes of affected women and highlights that women who benefited from the UTCP experienced increased frequency of restlessness but reduced frequency of hopelessness. Additionally, this paper examines the effects of fertility-restriction relaxation across different age cohorts and finds that the resulting mental health improvements are primarily concentrated among individuals aged 18 to 30. Furthermore, this paper examines the effects of fertility-restriction relaxation across regions with varying levels of development and finds that the improvements in mental health are primarily driven by couples from less developed areas. The findings reveal the profound impacts of fertility-restriction relaxation on mental health and underscore the importance of reproductive autonomy in promoting well-being.

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1 Introduction

The impacts of fertility restrictions on general well-being have long received limited attention from researchers. Furthermore, while eased restrictions have strengthened reproductive autonomy and granted couples greater freedom in their fertility choices, the effects of relaxing fertility restrictions on mental health remain unexplored. This paper is the first to examine the causal relationship between such relaxations and mental health status by using the enactment of China's universal two-child policy (UTCP) as a natural experiment and adopting the difference-in-differences method. It presents the first empirical evidence demonstrating that such a relaxation can improve the mental health of the general population, as evidenced by notable reductions in severe mental health issues and enhancements in overall health status.

The enactment of China's UTCP formally marked the end of China's one-child policy, one of the most stringent and influential family planning policies in the world, and granted all couples in China permission to have a second child for the first time in over 36 years (Zeng and Hesketh, 2016). After the UTCP was formally implemented on January 1, 2016, the considerable number of couples who previously suffered from stringent fertility restrictions under the one-child policy were permitted to have a second child, thus bringing some of them closer to their ideal number of children. Therefore, the UTCP offers a unique opportunity to explore the broader social implications of fertility restriction and its relaxation, particularly for mental health status.

Fertility restrictions can have detrimental consequences for mental health by causing parents to involuntarily deviate from the number of children they desire. Children can be considered a source of psychic income and satisfaction for most parents, which makes children a durable consumption good that can provide utility (Becker, 1960). The restrictions reduce the emotional satisfaction and psychic income typically gained from having the quality and quantity of children that perfectly align with parents' preferences. Therefore, relaxing such restrictions—which reduces human rights violations, enhances reproductive autonomy, and provides parents the opportunity to have their ideal quality and quantity of children—is expected to improve mental health.

This paper identifies the causal effects of fertility-restriction relaxation on mental health by applying the difference-in-differences method, classifying respondents into control and treatment groups based on whether they were affected by the policy change. Respondents are placed in the treatment group only if they were affected by the relaxation of fertility restrictions, as indicated by not qualifying for any exemptions that permitted a second child prior to the UTCP. Conversely, respondents are classified into the control group if they remained unaffected by the relaxation, as indicated by satisfying the criteria for exemptions that allowed a second child before the UTCP. The classification is jointly determined by the demographic characteristics required for qualifying for exemptions, the number of children a respondent has already had, and the number of children a respondent ideally desires.

Amid a series of revisions to China's family planning policy, some couples were granted permission to have a second child before the formal implementation of the UTCP, provided that their demographic characteristics satisfied the relevant exemption criteria. China's one-child policy was formally launched in 1979, initially forbidding any couple from having more than one child, regardless of whether they were from an urban or rural area (Attane, 2002; Zeng and Hesketh, 2016; Zhang, 2017). In the 30 years following the implementation of the policy, in response to strong resistance from rural residents especially and adverse consequences such as an increasingly aging population and imbalanced sex ratio, fertility restrictions were gradually and cautiously relaxed. In particular, prior to the formal implementation of the UTCP, couples were permitted to have a second child if they belonged to a minority ethnicity, were registered as agricultural residents when they had a girl as their firstborn child, or were the only child of their parents.

In addition to couples who are unaffected by the UTCP because they satisfy these demographic criteria, individuals who already have more than one child, have birthed the number of children they desire, or the ideal number of children[1] is zero or one are also not classified into the treatment group. These individuals are not necessarily similar to the individuals who qualify for exemptions under the one-child policy, as they have never been granted permission to have a second child and thus may be liable if they have a second child. However, they will not seek permission to have a second child once they meet any of the aforementioned conditions, and consequently they will not benefit from the UTCP. Therefore, respondents who meet any of the exemption criteria, already have more than one child, or already have their ideal number of children are considered unaffected by the UTCP and are placed in the control group.

As the UTCP was formally implemented on January 1, 2016, this paper considers data collected before 2016 as pre-treatment and data collected from 2016 onward as post-treatment. On this basis, this paper controls for the effects of time-invariant unobservable heterogeneity using the difference-in-differences approach and provides clear evidence for the causal relationship between the UTCP and changes in individuals' mental health.

This paper uses data from a nationally representative data set, the China Family Panel Studies (CFPS). Thanks to the panel structure of the CFPS data, I am able to compare changes in mental health for the same individual before and after the UTCP. This paper shows that the UTCP leads to significant improvements in both the mental and physical health of the individuals who are affected by it. This is evidenced by a substantial reduction in the risk of severe mental health illness and significant improvement in the interviewer-observed physical health status of respondents.

Moreover, this paper investigates the impacts of the relaxation of fertility restrictions on the health status of affected women. The effects of such relaxations on affected women are expected to be different from those on men since women usually bear disproportionate

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[1]The CFPS collected data on respondents' preferences regarding the ideal number of children with the following question: "How many children do you think would be ideal, regardless the policy restrictions?"

responsibility in childbirth and childcare. Theoretically, following the relaxation, women's mental health could have improved because of their enhanced reproductive autonomy, or it could have deteriorated because of the pressure of heightened expectations to have more children. Women simultaneously hold a public identity as material producers and a private identity as social reproducers, while disproportionately shouldering more household and caretaking responsibilities than men (Yingchun and Zhenzhen, 2020). The burden associated with this dual identity exposes women to negative consequences of childbearing, such as disadvantages in the labor market (He et al., 2023), and pressure from male partners regarding the number, gender composition, and birth interval of children (Qian and Jin, 2018).

Therefore, further empirical analysis of the net effects of relaxing fertility restrictions on women's mental health is crucial, as it can provide insights into gender inequality and changes in the responsibilities and pressure perceived by women. Compared with other individuals, women affected by the relaxation of fertility restriction experience a significant decrease in the frequency of hopelessness while reporting a higher frequency of restlessness two years after the UTCP. Additionally, in the first year after the UTCP, interviewers observe a significant improvement in the physical health status of women affected by the relaxation.

Furthermore, this paper explores the mental health effects of relaxing fertility restrictions across different age cohorts. It finds that the improvements in mental health are primarily concentrated among individuals aged 18 to 30. Individuals in this age cohort exhibit significant reductions in the risk of severe mental health illness and in the frequency of negative emotions, as well as notable improvements in interviewer-observed physical health status. The positive effects of relaxations on health outcomes among individuals aged 18 to 30 persisted two years after the UTCP's implementation. For individuals aged 31 to 45, significant improvements in mental health status and interviewer-observed physical health status were also observed following the UTCP's implementation. However, the positive effects on health outcomes were no longer present among individuals aged 31 to 45 two years after the policy was enacted.

Although women over 40 generally have very limited fertility, making couples in this age range unlikely to choose to have a second child even if permitted, the relaxation of fertility restriction may still improve their mental health by giving them the chance to have more grandchildren. However, no significant improvements in mental health among couples aged over 40 are observed after the UTCP is implemented. Notably, while younger individuals generally experience reductions in the frequency of feeling restless, individuals over 40 exhibit an unexpected increase in that frequency. This could be because middle-aged and older individuals are often expected to assume greater caring responsibilities for young children in the Chinese cultural context.

Additionally, this paper examines the effects of fertility-restriction relaxation on the mental health of couples from regions with varying levels of development. It provides evidence that improvements in mental health are primarily concentrated among individuals from less developed areas. This finding suggests that the improvements in mental health

may stem from enhanced reproductive autonomy. Compared to couples from less developed regions, those from more developed areas were previously prevented from having more children not only by fertility restrictions but also the high cost of raising an additional child. Consequently, these couples experienced only limited enhancement in reproductive autonomy following the relaxation. As a result, no significant impact on mental health is observed among affected couples in more developed regions.

To the best of my knowledge, this paper is the first to explore the causal relationship between the relaxation of fertility restriction and mental health status. By using China's UTCP as a natural experiment and adopting a novel identification strategy, this paper provides empirical evidence of the positive impacts of such relaxations on individuals' mental health, thus filling a significant gap in the literature. Despite some qualitative or descriptive evidence suggesting that fertility restrictions can harm mental health, this paper is the first to undertake a systematic analysis using a representative sample and to attempt to establish a clear causal effect between relaxations and mental health improvements.

Although no study has explored the causal effects of relaxing fertility restrictions on mental health, some research suggests that fertility restrictions cause substantial deterioration in mental health. China's one-child policy, one of the earliest and longest-lasting family planning policies worldwide, imposed stringent fertility restrictions on couples and had profound effects on individuals' mental and physical health (Chen and Fang, 2021). Couples who did not qualify for any exemptions under this policy were often forced to have fewer children than they desired. The severe restriction on reproductive autonomy and the resulting involuntary deviation from couples' ideal number of children caused deterioration in mental health status and higher risk of mental illness among elderly parents (Chen and Fang, 2021), children who are the only child in their family (Liu et al., 2005), parents who lost their only child (Wang et al., 2021; Yin et al., 2018), and the general population (Zeng et al., 2020).

Mental health deteriorates in response to fertility restrictions including not just family planning policies but any factor that causes couples to involuntarily deviate from the number of children they desire, including inaccessible contraception, interference with reproductive autonomy, and infertility. For example, the revocation of the US constitutional right to a first-trimester abortion (when the Supreme Court overturned the 1973 *Roe v. Wade* decision) harmed women's mental health (Liu et al., 2023). Women who have experienced reproductive coercion—that is, interference with reproductive autonomy and deprivation of reproductive-health decision-making rights—report a higher prevalence of mental health issues compared to those who did not (Price et al., 2022). Furthermore, women who have experienced conception failure demonstrate higher likelihood of taking psychiatric medication, and this likelihood is significantly higher for women who have suffered from persistent infertility (Bögl et al., 2024).

Although the studies discussed above provide some evidence of the negative impacts of fertility restrictions on mental health, their findings are still limited to descriptive analyses or specific population cohorts, leaving the effects of fertility-restriction relaxations on the

mental health of the general population undetermined. These studies show that involuntary deviations from couples' ideal number of children, whether due to reproductive coercion, infertility, or fertility restrictions associated with family planning policies, are linked to deterioration in mental health. However, no research has determined whether relaxation of fertility restrictions could improve mental health by reducing the involuntary deviation. This paper fills this void by presenting the first empirical evidence of the positive effects of relaxing fertility restrictions on mental health.

The rest of this paper is structured as follows: Section 2 introduces the identification strategy and my data and empirical model. Section 3 presents the empirical results derived from regressions using the difference-in-differences method and fixed-effects models. Section 4 concludes and outlines potential avenues for future research.

Data

This paper uses data from the 2014 to 2018 waves of the CFPS to examine the causal effects of the UTCP on mental health. The 2010 and 2012 waves are also included in the analyses but only to identify the parallel trends of the control and treatment groups prior to the UTCP. The CFPS is a nationally representative survey that tracks and collects data on both economic and non-economic aspects of individuals' lives in China every other year (Xie and Hu, 2014). To ensure balance in the panel data set, this paper excludes the respondents who dropped out midway through the survey. Considering the potential impacts on mental health of confounding factors driving changes in fertility preferences, this paper also excludes respondents who report changes in the number of children they would ideally have in 2018 to enhance the validity and credibility of the causal inference. After excluding these respondents, 13,918 observations remain per wave, totaling 41,754 observations. However, because of missing data, some variables have fewer observations. Table 1 reports the descriptive statistics of the variables used in the analysis.

Table 1: Descriptive Statistics

VARIABLES	(1) N	(2) Mean	(3) SD	(4) min	(5) max
Treatment Dummy Indicator	41,754	0.341	0.474	0	1
Post Treatment 1 (Year 2016)	41,754	0.333	0.471	0	1
Post Treatment 2 (Year 2018)	41,754	0.333	0.471	0	1
Mental Health Symptom	39,193	0.0574	0.233	0	1
Depression	39,257	0.686	0.768	0	3
Needs Effort	39,273	0.631	0.812	0	3
Restless	39,284	0.672	0.870	0	3
Hopeless	15,329	0.393	0.752	0	3
Interviewer-Observed Health	35,437	5.613	1.215	1	7
Residential Area	40,101	0.263	0.441	0	1
Age	41,752	47.22	15.24	16	99
Educational Background	41,730	2.753	1.492	1	9
Single	40,202	0.148	0.355	0	1
Employment	41,754	0.732	0.443	0	1
Urban	40,742	0.474	0.499	0	1
log Personal Income	40,931	3.054	4.497	0	13.85

Treatment Group and Post-Treatment Dummy Variables

China's family planning policy has undergone a series of changes since the formal launch in 1979 of the one-child policy, which forbade any couple from having more than one child regardless of whether they were from an urban or rural area (Attane, 2002; Zeng and Hesketh, 2016; Zhang, 2017). The policy was relaxed when it received strong resistance, especially from rural residents, because of the weight traditional Chinese culture places on males as workers and objects of affection (Attane, 2002; Zeng and Hesketh, 2016; Zhang, 2017). By the mid-1980s, most regions in mainland China had gradually eased the fertility restriction, allowing couples who were living in rural areas and had a girl as their first child and individuals who belonged to minority ethnicity groups to have a second child (Yi, 2007; Zeng and Hesketh, 2016; Zhang, 2017).

Nearly three decades after the start of the one-child policy, its negative consequences—such as the increasingly aging population and imbalanced sex ratio—began to outweigh the benefits brought by the reduction in fertility and mortality (Zeng and Hesketh, 2016). Facing the threats of slow economic growth and demographic decline, the government further adjusted family planning policy cautiously and gradually (Zeng and Hesketh, 2016). From 2007, couples were permitted to have a second child if both husband and wife were the only child of their parents. This "selective two-child policy" was further relaxed in November 2013, allowing couples to have a second child if either spouse was an only child (Zeng and Hesketh, 2016).

By the beginning of 2014, couples were permitted to have a second child if they met one of the following conditions: they belonged to one of the minority ethnic groups; they resided in a rural area (with agricultural residential registration) and had a girl as their firstborn child; or either of them was an only child. These couples were not affected by the UTCP, as they were already eligible to have a second child. However, they were not the only individuals unaffected by the UTCP.

Couples who did not satisfy any of the above conditions may also have been unaffected by the UTCP if they already had more than one child or they had as many children as they wanted. Specifically, couples who already had more than one child were unaffected by the UTCP, as there was no longer a need for permission once a second child was born. Similarly, couples who had as many children as they wanted were unaffected since they were no longer constrained by the family planning regulations and would not opt to have more children, regardless of whether permission was granted.

Moreover, respondents who reported that their ideal number of children was one or zero are considered unaffected by the UTCP, as they could choose to have their desired number of children regardless of the policy. The CFPS collects data on respondents' preferred number of children through the following question: "How many children do you think would be ideal, regardless the policy restrictions?"

This paper classifies respondents into a control group and a treatment group based on the policy-related demographic characteristics, the number of children they have already had, and the number of children they would ideally have. Specifically, respondents are classified into the control group if they meet any of the previously outlined conditions. A respondent is classified into the treatment group only if they do not belong to a minority ethnicity, either do not hold an agricultural residential registration or hold one but have a boy as their firstborn child, are not an only child, have no more than one child, and prefer to have more children. The variable *Treatment Dummy Indicator* indicates whether a respondent is affected by the UTCP, with 0 indicating the respondent is not affected and 1 indicating they are.

As noted, since the UTCP was formally implemented on January 1, 2016, data collected prior to 2016 are considered pre-treatment, while data collected in the 2016 and 2018 waves are classified as post-treatment. The binary variable *Post Treatment* indicates whether the data were collected before or after the implementation of the UTCP.

Mental Health Variables

The CFPS uses different scales to assess respondents' mental health status across various waves of the survey. In the 2012 wave, the 20-item Centre for Epidemiologic Studies Depression Scale (CES-D-20) is used, while the 2014 wave employs the 6-item version of the Kessler Psychological Distress Scale (K6). The CFPS then returned to using the CES-D-20 in the 2016 wave, followed by the 8-item version of the Centre for Epidemiologic Studies Depression Scale (CES-D-8) in the 2018 wave.

The K6 uses a five-point scale (0–4) to measure individuals' psychological distress through six questions about emotional states, where 0 indicates "never" and 4 indicates "all of the time" (Kessler et al., 2002). Both the CES-D-20 and CES-D-8 employ a four-point scale (0–3) to assess respondents' depression symptoms, covering areas such as depression moods, negative feelings, loss of appetite, and sleep disturbance (Radloff, 1977). Given the limitations on data and the different scales and cutoffs used in the K6 and CES-D, my analyses of changes in mental health status before and after the UTCP's implementation can only be conducted after recoding the different scales.

The variation in mental-health-status measurement scales used by the CFPS complicates the analysis of changes in respondents' mental health over time. However, several questions in the K6 and CES-D-20/CES-D-8 are roughly identical, with similar phrasing and measuring the same emotional aspects. The first emotion measured by both K6 and CES-D is depression. The K6 measures individuals' depression with the following question: "During the past 30

days, about how often did you feel so depressed that nothing could cheer you up?" and the CES-D measures depression with the question "During the past week, how often you have felt depressed?"

Second, both the K6 and the CES-D scales include questions about whether individuals feel that everything they do requires effort. In the K6, the question is "During the past 30 days, how often did you feel that everything was an effort?" Similarly, the CES-D asks "During the past week, how often you have felt that everything you did was an effort?"

The third shared question between the K6 and CES-D pertains to the frequency of feeling restless. In the K6, respondents are asked "During the past 30 days, about how often did you feel restless or fidgety?" while the CES-D asks "During the past week, how often you have felt your sleep was restless?"

Additionally, there is a question about the frequency of feeling hopeless that appears on both the K6 and the 20-item CES-D but does not exist on the 8-item CES-D scale. In the K6, the question is "During the past 30 days, about how often did you feel hopeless?" The corresponding CES-D question is "During the past week, how often you have felt hopeful about the future?" As the question in the CES-D 20-item scale regarding hope was phrased to assess respondents' positive affections, the responses to this question are reverse-coded to ease comparison with the question in the K6 and maintain consistency in my analyses (Radloff, 1977).

The scale on the K6 runs from 0 (None of the time) to 1 (A little of the time), 2 (Some of the time), 3 (Most of the time), and 4 (All of the time), while the CES-D scale run from 0 (Almost never) to 1 (Sometimes), 2 (Often), and 3 (Most of the time). I recode the K6 responses on the CES-D's 0–3 scale to harmonize the data across these scales. Specifically, 0 is recoded as 0 (Rarely or none of the time), 1 and 2 are combined and recoded as 1 (Some or a little of the time), and 3 and 4 are recoded as 3 (Most or all of the time).

Furthermore, this analysis constructs a binary indicator, *Mental Health Symptom*, to represent the risk of severe mental health illness based on the corresponding cutoff of the K6 scale and the CES-D 8-item scale. The cutoff of high risk of severe mental health illness on the K6 scale is 13 out of 24 (Prochaska et al., 2012), and the cutoff on the CES-D 8-item scale is 12 out of 24 (calculated based on the 28/60 ratio from the CES-D 20-item version). The analyses based on the risk of experiencing severe mental health illness could be more reliable than analyses based on any single aspect of mental health status, as the validity of the cutoffs, the strong correlation, and the similarity of the mathematical distribution between the K6 and CES-D scales have been confirmed in previous studies (Sakurai et al., 2011; Tomitaka et al., 2017).

Empirical Model

I employ the following empirical model based on the difference-in-differences method to explore the causal effects of the UTCP on mental health:

$$Y_{it} = \alpha + \beta_1 \textit{Experiment Group}_i \times \textit{Post Treatment}_t + \beta_2 X_{it} + \lambda_i + \upsilon_t + \varepsilon_{it} \tag{1}$$

Here, i represents an individual and t represents a period. The dependent variables in different empirical analyses include mental health status, measured by the K6 and CES-D scales, and physical health status, observed by interviewers. The interaction term of *Experiment Group* and *Post Treatment* is the main explanatory variable. X_{it} is a vector of demographic characteristics including age, marital status, educational background, residential-area type, employment status, and income. Regressors λ_i and υ_t represent individual fixed effects and time fixed effects, respectively.

Results

This section presents the results of regressions of the UTCP's implementation on individuals' mental health status and physical health status. Year and province fixed effects are controlled for in all regressions. Table 2 displays the baseline regression results.

Table 2: Regression Results of Baseline Difference-in-Differences Analysis

VARIABLES	(1) Mental Health Symptom	(2) Depression	(3) Needs Effort	(4) Restless	(5) Hopeless	(6) Observed Health
Treatment×2016	-0.015***	-0.034*	-0.071***	-0.042**	-0.104**	0.133***
	(0.005)	(0.018)	(0.018)	(0.019)	(0.053)	(0.027)
Treatment×2018	-0.016***	-0.045**	-0.090***	0.002		0.076**
	(0.005)	(0.018)	(0.018)	(0.020)		(0.031)
Age	0.003	0.021	0.006	0.007	0.096***	0.001
	(0.005)	(0.014)	(0.016)	(0.013)	(0.008)	(0.024)
Single	0.005	-0.052	0.016	0.019	0.005	0.032
	(0.013)	(0.039)	(0.036)	(0.044)	(0.387)	(0.080)
Educational Background	-0.008***	0.000	-0.012**	0.005	-0.048***	0.009
	(0.002)	(0.006)	(0.006)	(0.006)	(0.016)	(0.008)
Residential Area	-0.000	0.027	0.020	-0.017	0.222	0.115**
	(0.007)	(0.024)	(0.027)	(0.028)	(0.160)	(0.051)
log Personal Income	-0.001**	-0.000	-0.003***	-0.006***	-0.001	0.002
	(0.000)	(0.001)	(0.001)	(0.001)	(0.005)	(0.002)
Employment	-0.021***	-0.043***	-0.064***	-0.018	0.064	0.148***
	(0.005)	(0.016)	(0.017)	(0.018)	(0.071)	(0.029)
Constant	-0.067	-0.268	0.427	0.271	-4.255***	5.071***
	(0.226)	(0.625)	(0.719)	(0.597)	(0.425)	(1.156)
Observations	38,798	38,860	38,876	38,887	15,085	35,140
R-squared	0.016	0.006	0.041	0.060	0.383	0.014
Number of pid	13,442	13,442	13,443	13,443	12,914	13,282

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The results indicate that respondents who were affected by the UTCP reported a significantly lower risk of having severe mental health illness compared to unaffected individuals. Specifically, the UTCP reduced affected respondents' mental-health-symptoms score by -0.015 (95% CI = -0.025 to -0.006). The impact persisted even two years after the UTCP's implementation, with a coefficient of -0.016 (95% CI = -0.027 to -0.006).

The results displayed in the sixth column indicate that the UTCP's implementation also significantly improved the physical health status of respondents who were affected by it. The interviewer-observed physical health status of respondents in the treatment group increased by 0.133 (95% CI = 0.079 to 0.186) in the first year after implementation. Two years after implementation, the improvements persisted among affected couples, though at slightly reduced magnitude and statistical significance (0.076, 95% CI = 0.014 to 0.138). These results suggest the implementation had a sustained effect on mental health and gradually diminishing impact on physical health.

Moreover, respondents who were affected by the implementation reported improvements in mental health, as they generally experienced significant reductions in the frequency of certain negative emotions. Specifically, respondents in the treatment group experienced decreases in the frequency of Depression by -0.034 (95% CI = -0.069 to -0.001), Needs Effort by -0.071 (95% CI = -0.105 to -0.036), Restless by -0.042 (95% CI = -0.080 to 0.004), and Hopeless by -0.104 (95% CI = -0.208 to 0.0003) in the first year after implementation. The UTCP improved respondents' mental health even two years after implementation by reducing the frequency of Depression and Needs Effort by -0.045 (95% CI = -0.080 to -0.010) and -0.090 (95% CI = -0.126 to -0.055), respectively. However, two years after implementation, the reduced frequency of Restless is not observed anymore.

Furthermore, this paper analyzes the effects of the implementation on women's mental health status and physical health status by conducting regressions on the interaction term of *Gender* and *Treatment Group*. The results of regressions with the very same empirical model and that interaction term are presented in Table 3. All regressions control for year and province fixed effects to mitigate the impacts of unobserved factors that do not vary with time and geographic location.

Table 3: Regression Results of Difference-in-Differences Analysis with Interactions of Gender and Treatment Group

VARIABLES	(1) Mental Health Symptom	(2) Depression	(3) Needs Effort	(4) Restless	(5) Hopeless	(6) Observed Health
Female×Treatment×2016	-0.004	-0.022	-0.033	-0.002	-0.126**	0.088***
	(0.006)	(0.023)	(0.022)	(0.025)	(0.062)	(0.034)
Female×Treatment×2018	-0.005	-0.012	-0.033	0.066**		0.019
	(0.007)	(0.022)	(0.023)	(0.026)		(0.039)
Age	0.003	0.020	0.005	0.007	0.093***	0.001
	(0.005)	(0.014)	(0.015)	(0.013)	(0.006)	(0.024)
Single	0.005	-0.049	0.021	0.019	0.003	0.030
	(0.013)	(0.039)	(0.036)	(0.044)	(0.405)	(0.080)
Educational Background	-0.008***	-0.001	-0.015**	0.004	-0.050***	0.011
	(0.002)	(0.006)	(0.006)	(0.006)	(0.016)	(0.008)
Residential Area	-0.000	0.026	0.019	-0.018	0.219	0.115**
	(0.007)	(0.024)	(0.027)	(0.028)	(0.161)	(0.051)
log Personal Income	-0.001**	-0.000	-0.003***	-0.006***	-0.000	0.002
	(0.000)	(0.001)	(0.001)	(0.001)	(0.005)	(0.002)
Employment	-0.021***	-0.044***	-0.065***	-0.019	0.062	0.149***
	(0.005)	(0.016)	(0.017)	(0.018)	(0.071)	(0.029)
Constant	-0.053	-0.250	0.478	0.310	-4.112***	5.063***
	(0.225)	(0.623)	(0.708)	(0.598)	(0.352)	(1.157)
Observations	38,798	38,860	38,876	38,887	15,085	35,140
R-squared	0.016	0.006	0.040	0.060	0.383	0.014
Number of pid	13,442	13,442	13,443	13,443	12,914	13,282

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: The table presents the empirical results of regressions with the difference-in-differences method and a fixed-effects model. Individual and year fixed effects are controlled for in all regressions. The dependent variables for different regressions include mental health symptoms, specific negative emotions, and physical health status as observed by interviewers. *Female×Treatment×Year* is the interaction term between *Female*, *Treatment*, and *Year*, where *Female* indicates whether a respondent's gender is female, *Treatment* indicates whether a respondent was affected by the policy change, and *Year* refers to the specific year. The logarithm of personal income was calculated after adding 1 to all observations. The standard errors are presented in parentheses. Descriptions of the explanatory variables are provided in the note of Table 1.
* represents significance at 90% confidence interval.
** represents significance at 95% confidence interval.
*** represents significance at 99% confidence interval.

Compared with other respondents, women affected by the UTCP experienced a significant decrease in the frequency of hopelessness by −0.126 (95% CI = −0.248 to 0.004) in the first

year after its implementation. However, they exhibited a significant increase in the frequency of restlessness by 0.066 (95% CI = 0.015 to 0.117) two years after implementation. Women who enjoyed the benefits of the UTCP also experienced a significant improvement in physical health status, as observed by interviewers, of 0.088 (95% CI = 0.022 to 0.153) in the first year after implementation. However, the positive effects on women's physical health did not persist for two years, as there was no significant difference in interviewer-observed health status between affected women and other respondents in 2018.

Regarding mental health symptoms and the frequency of certain other negative emotions such as Depression and Needs Effort, affected women did not show significant differences from other respondents. Though the UTCP did not directly reduce affected women's risk of severe mental illness compared with other respondents, it affected their mental health status by bringing them more hope and higher frequency of being restless.

As affected women only experienced a significantly higher frequency of restlessness two years after the UTCP's implementation, this effect could be explained by women's disproportionate housework and fertility pressure (Qian and Jin, 2018; Yang and Zheng, 2020). Compared with their partners, women are expected to shoulder greater responsibility for household chores, caregiving, and childbearing. Concurrently, they face discrimination and disadvantages in the labor market, as well as lower salaries, diminished interpersonal communication, and fewer social activities (Killewald, 2013; Roeters et al., 2016; Qian and Jin, 2018; Yang and Zheng, 2020; He et al., 2023). Women are therefore overwhelmed by pressures from both familial expectations and societal responsibilities, which culminate in increases in the frequency of being restless.

Furthermore, the reduced incidence of hopelessness among impacted women after the UTCP's implementation could be attributable to the emerging hope for potential support from their children in the future. Women's well-being can be improved through childbearing, as emotional and financial support from children in the future is expected (Yang and Zheng, 2020). Though for some couples, having a second child may not be feasible in the foreseeable future, the UTCP both relaxed fertility restrictions and gave women an optimistic vision, leading to a significant reduction in the frequency of hopelessness.

This paper further examines the effects of the UTCP on the mental and physical health status of respondents across different age cohorts. Table 4 presents the regression results from the original empirical model, incorporating interaction terms between age cohorts and *Treatment Group*. All regressions include year and province fixed effects to control for unobserved factors that are constant over time and across geographic locations.

Table 4: Regression Results of Difference-in-Differences Analysis with Interactions of Age Cohorts and Treatment Group

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Mental Health Symptom	Depression	Needs Effort	Restless	Hopeless	Observed Health
Age 18-30×Treatment×2016	-0.023***	-0.095***	-0.153***	-0.140***	-0.162**	0.120***
	(-3.716)	(-3.671)	(-6.082)	(-5.220)	(-2.072)	(3.040)
Age 18-30×Treatment×2018	-0.029***	-0.090***	-0.196***	-0.137***		0.255***
	(-4.271)	(-3.324)	(-7.281)	(-4.427)		(5.034)
Age 31-40×Treatment×2016	-0.029***	-0.057*	-0.117***	-0.070**	-0.173*	0.166***
	(-3.406)	(-1.807)	(-3.773)	(-1.985)	(-1.669)	(3.282)
Age 31-40×Treatment×2018	-0.009	-0.044	-0.118***	-0.052		0.140***
	(-1.010)	(-1.420)	(-4.097)	(-1.541)		(2.639)
Age 41-60×Treatment×2016	-0.004	0.001	0.006	0.015	-0.096	0.131***
	(-0.607)	(0.021)	(0.250)	(0.541)	(-1.212)	(3.358)
Age 41-60×Treatment×2018	-0.012	-0.025	-0.038	0.110***		0.019
	(-1.530)	(-0.954)	(-1.412)	(3.825)		(0.422)
Age Over 60×Treatment×2016	-0.006	0.074	0.002	0.113**	0.087	0.100
	(-0.434)	(1.635)	(0.038)	(2.215)	(0.652)	(1.426)
Age Over 60×Treatment×2018	-0.016	-0.014	0.013	0.070		-0.086
	(-1.253)	(-0.377)	(0.312)	(1.518)		(-1.189)
Age	0.003	0.023	0.007	0.007	0.097***	0.002
	(0.657)	(1.639)	(0.439)	(0.594)	(11.064)	(0.090)
Single	0.004	-0.052	0.003	0.001	0.021	0.068
	(0.283)	(-1.311)	(0.089)	(0.019)	(0.056)	(0.844)
Educational Background	-0.008***	0.001	-0.010	0.008	-0.046***	0.006
	(-4.049)	(0.227)	(-1.625)	(1.259)	(-2.854)	(0.792)
Residential Area	0.000	0.028	0.024	-0.010	0.220	0.108**
	(0.008)	(1.161)	(0.890)	(-0.374)	(1.379)	(2.120)
log Personal Income	-0.001**	-0.000	-0.003**	-0.006***	0.000	0.001
	(-2.127)	(-0.156)	(-2.399)	(-4.372)	(0.038)	(0.737)
Employment	-0.020***	-0.041**	-0.058***	-0.010	0.067	0.142***
	(-3.701)	(-2.550)	(-3.420)	(-0.545)	(0.942)	(4.941)
Constant	-0.080	-0.351	0.386	0.263	-4.322***	5.026***
	(-0.358)	(-0.552)	(0.539)	(0.450)	(-9.279)	(4.287)
Observations	38,798	38,860	38,876	38,887	15,085	35,140
R-squared	0.016	0.007	0.042	0.062	0.384	0.015

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VARIABLES	(1) Mental Health Symptom	(2) Depression	(3) Needs Effort	(4) Restless	(5) Hopeless	(6) Observed Health
Number of pid	13,442	13,442	13,443	13,443	12,914	13,282

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: The table presents the empirical results of regressions with the difference-in-differences method and a fixed-effects model. Individual and year fixed effects are controlled for in all regressions. The dependent variables for different regressions include *Mental Health Symptom*, specific negative emotions, and physical health status as observed by interviewers. *Age Cohort×Treatment×Year* represents the interaction term between *Age Cohort*, *Treatment*, and *Year*, where *Age Cohort* indicates whether a respondent's age is in the corresponding range, *Treatment* indicates whether a respondent was affected by the policy change, and *Year* refers to the specific year. The logarithm of personal income was calculated after adding 1 to all observations. The standard errors are presented in parentheses. Descriptions of the explanatory variables are provided in the note of Table 1.
* represents significance at 90% confidence interval.
** represents significance at 95% confidence interval.
*** represents significance at 99% confidence interval.

Results in Table 4 indicate that the positive effects of the UTCP on mental health are primarily concentrated among respondents aged 18 to 30. Following the implementation of the UTCP, affected individuals in this age cohort experienced a significant reduction in the risk of severe mental health symptoms, with a decrease of −0.023 (95% CI = −0.035 to −0.011). These improvements persisted two years after the implementation, as reflected in a continued reduction in the risk of severe mental health illness of −0.029 (95% CI = −0.042 to −0.016) among affected individuals. Additionally, these respondents experienced significant reductions in the frequency of all analyzed negative emotions and showed marked improvements in interviewer-observed physical health status.

Regarding respondents in other age cohorts, significant improvements in mental health status are only observed among those aged 31 to 40, with a reduction in the risk of severe mental health symptoms of −0.029 (95% CI = −0.046 to −0.012). However, two years after the relaxation of fertility restrictions, individuals in this age cohort no longer exhibited a significant difference in the risk of severe mental health illness compared to unaffected individuals. Similarly, respondents in this age cohort reported significant reductions in the frequency of all four negative emotions, along with improvements in interviewer-observed physical health status. However, none of these improvements, except for the reduced frequency of feeling that everything requires effort, persisted beyond two years after the relaxation.

Among respondents aged 41 to 60 and those over 60, significant improvements in mental health were not generally observed. However, individuals aged 46 to 60 reported a significant increase in the frequency of feeling restless two years after the policy's implementation, as did individuals over 60 both in the first year of the policy implemented. These results are not surprising, especially considering the influence of traditional cultural norms and contemporary social conditions in China, where middle-aged and older adults frequently assume a greater share of childcare responsibilities for younger children.

This paper further explores the effects of the UTCP on mental health of respondents from regions with varying levels of development. The more developed regions include China's four municipalities and five other provinces that ranked in the top 10 in terms of per capita GDP and per capita disposable income in 2016.[2] Table 5 presents the regression results with the original empirical model, with Panel A covering respondents from less developed regions and Panel B covering respondents from more developed regions.

Table 5: Regression Results of Difference-in-Differences Analysis on Areas with Different Development Levels

VARIABLES	(1) Mental Health Symptom	(2) Depression	(3) Needs Effort	(4) Restless	(5) Hopeless	(6) Observed Health
Panel A: Less Developed Areas						
Treatment×2016	-0.020***	-0.053**	-0.078***	-0.059**	-0.075	0.139***
	(0.006)	(0.022)	(0.022)	(0.023)	(0.063)	(0.032)
Treatment×2018	-0.020***	-0.047**	-0.103***	-0.014		0.061
	(0.006)	(0.022)	(0.022)	(0.024)		(0.038)
Age	0.004	0.019	0.007	0.002	0.321*	-0.011
	(0.006)	(0.016)	(0.018)	(0.014)	(0.165)	(0.025)
Single	0.006	-0.086*	0.023	0.040	-0.231	-0.012
	(0.015)	(0.047)	(0.043)	(0.053)	(0.434)	(0.095)
Educational Background	-0.008***	0.001	-0.009	0.013*	-0.035**	0.007
	(0.002)	(0.007)	(0.007)	(0.007)	(0.017)	(0.009)
Residential Area	0.005	0.052	0.053	0.012	0.176	0.186***
	(0.009)	(0.032)	(0.034)	(0.036)	(0.201)	(0.066)
log Personal Income	-0.001*	0.001	-0.003**	-0.005***	-0.005	0.005*
	(0.000)	(0.001)	(0.001)	(0.002)	(0.006)	(0.002)
Employment	-0.021***	-0.031	-0.072***	-0.042**	0.047	0.163***
	(0.007)	(0.019)	(0.020)	(0.021)	(0.080)	(0.034)
Constant	-0.118	0.097	0.601	0.113	-13.791*	5.736***
	(0.256)	(0.705)	(0.835)	(0.666)	(7.362)	(1.131)
Observations	28,567	28,601	28,611	28,616	11,164	25,959
R-squared	0.018	0.006	0.041	0.055	0.374	0.016
Number of pid	9,996	9,996	9,997	9,997	9,577	9,868

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[2]In 2016, the regions in China that ranked in the top 10 in both per capita GDP and per capita disposable income included the four municipalities (Beijing, Shanghai, Tianjin, and Chongqing) and five provinces (Jiangsu, Zhejiang, Fujian, Guangdong, and Shandong).

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VARIABLES	(1) Mental Health Symptom	(2) Depression	(3) Needs Effort	(4) Restless	(5) Hopeless	(6) Observed Health
Panel B: More Developed Areas						
Treatment×2016	-0.000	0.015	-0.047	-0.004	-0.181*	0.083
	(0.008)	(0.032)	(0.031)	(0.036)	(0.100)	(0.051)
Treatment×2018	-0.007	-0.030	-0.041	0.041		0.037
	(0.009)	(0.032)	(0.033)	(0.037)		(0.057)
Age	-0.000	0.032	-0.012	0.026	0.102***	0.066
	(0.009)	(0.025)	(0.022)	(0.032)	(0.007)	(0.056)
Single	-0.003	0.031	-0.013	-0.094	0.974***	0.155
	(0.025)	(0.071)	(0.075)	(0.087)	(0.172)	(0.150)
Educational Background	-0.005*	-0.002	-0.026**	-0.032**	-0.132***	0.012
	(0.003)	(0.012)	(0.011)	(0.014)	(0.040)	(0.018)
Residential Area	-0.014	-0.066*	-0.084*	-0.095**	0.366	-0.061
	(0.010)	(0.039)	(0.045)	(0.047)	(0.261)	(0.081)
log Personal Income	-0.001**	-0.003*	-0.005**	-0.008***	0.012	-0.000
	(0.001)	(0.002)	(0.002)	(0.002)	(0.009)	(0.003)
Employment	-0.022**	-0.073**	-0.041	0.049	0.133	0.112**
	(0.009)	(0.029)	(0.031)	(0.034)	(0.149)	(0.054)
Constant	1.035**	-0.074	2.664**	0.702	-4.722***	3.625
	(0.443)	(1.169)	(1.086)	(1.512)	(0.467)	(2.667)
Observations	10,231	10,259	10,265	10,271	3,921	9,181
R-squared	0.016	0.010	0.044	0.078	0.406	0.017
Number of pid	3,665	3,665	3,665	3,665	3,343	3,462

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: The table presents the empirical results of regressions with the difference-in-differences method and a fixed-effects model. Individual and year fixed effects are controlled for in all regressions. The dependent variables for different regressions include *Mental Health Symptom*, specific negative emotions, and physical health status as observed by interviewers. *Treatment×Year* represents the interaction term between *Treatment* and *Year*, where *Treatment* indicates whether a respondent was affected by the policy change and *Year* refers to the specific year. The logarithm of personal income was calculated after adding 1 to all observations. The standard errors are presented in parentheses. Descriptions of the explanatory variables are provided in the note of Table 1.
* represents significance at 90% confidence interval.
** represents significance at 95% confidence interval.
*** represents significance at 99% confidence interval.

The results indicate that the positive effects on mental health are primarily driven by couples from less developed regions. Following the implementation of the UTCP, affected

couples from less developed regions reported a significant reduction in the risk of severe mental health illness (-0.020, 95% CI $= -0.032$ to -0.009), with this improvement in mental health persisting two years after the relaxation of fertility restrictions (-0.020, 95% CI $= -0.033$ to -0.008). Aside from hopelessness, significant reductions in the frequency of all other negative emotions were also observed among affected couples from less developed regions. These couples also experienced a significant improvement in interviewer-observed health status in the first year following the UTCP implementation, although this effect did not persist two years after implementation.

Improvement in mental health was not generally observed among couples from more developed regions. Apart from reporting a significant reduction in the frequency of feeling hopeless in the first year after implementation, affected couples from these regions showed no significant differences in the risk of severe mental health illness or the frequency of other negative emotions compared to unaffected couples. Additionally, these couples did not report significant improvements in interviewer-observed health status after the fertility restrictions were relaxed.

The different effects of the UTCP on the mental health of couples from regions with varying development levels may be attributable to the differing magnitude of the enhancement in reproductive autonomy as perceived by couples after the policy change. Although all affected couples from different regions were granted permission to have a second child, the feasibility of having more children varied with the level of development in a region. The UTCP brought affected couples from less developed areas the opportunity to have more children, as they desired, as the barrier to having a second child had primarily been the fertility restrictions.

However, for couples from more developed regions, obstacles to having more children may include not only fertility restrictions but also practical concerns such as expenses associated with raising an additional child. These practical concerns made having more children a less viable option for couples from more developed regions even after the fertility restrictions were relaxed. This finding suggests that the improvements in mental health may stem from enhanced reproductive autonomy. If relaxing fertility restrictions could only enhance couples' reproductive autonomy marginally because people felt other factors like economic pressures, the mental health improvements might no longer be significant.

Test of Parallel Trends

I conduct a series of tests with an event-study estimation to identify whether individuals' mental health status and physical health status exhibited parallel trends before the UTCP. Figure 1 shows the results of the tests.

Figure 1: Parallel-Trends Test with Event-Study Estimation

Mental Health Symptoms   Interviewer Observed Health   Depression

Needs Effort   Restless   Hopeless
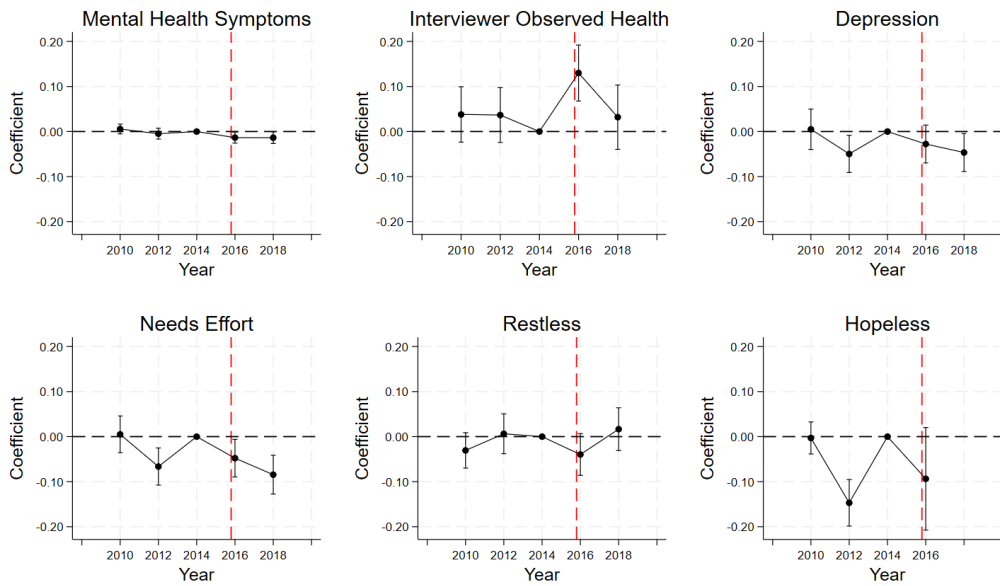
Note: The table demonstrates the changing trends of a series of dependent variables before and after the universal two-child policy was formally implemented. Individuals' mental health status and physical health status as observed by interviewers in 2014 are the reference points. The bars represent coefficients of different periods with 95% confidence interval and robust standard errors. Individual and year fixed effects are included in all regressions.

The results presented in Figure 1 indicate the parallel-trends assumption necessary for the difference-in-differences method to be valid was satisfied for mental health status, as the coefficients remain stable around 0 before 2016 and there is no significant difference in mental health symptoms between control-group individuals and treatment-group individuals before the UTCP implementation. After implementation, individuals who were affected by the permission to have a second child experienced significant improvement in mental health as evidenced by a reduction in the risk of severe mental health illness, which was not observed among individuals who were not affected by the UTCP. Such an improvement remains two years after the UTCP's implementation, which suggests a potential long-term effect of the implementation on mental health.

Health status as observed by interviewers also satisfied the parallel-trends assumption, as I observe no divergence between control-group individuals and treatment-group individuals before the UTCP, while individuals who were affected by the UTCP demonstrated significantly better physical health status compared with individuals who were not affected, as indicated by the increase in physical-health-status score reported by interviewers. However, such differences in health status are not significant anymore in 2018, which might suggest the effects of the UTCP on physical health will not be sustained in the long term.

Regarding specific emotions related to mental health, they generally exhibit stable trends before the UTCP, although affected couples reported lower frequencies of Depression, Needs

Effort, and Hopeless in 2012. Following the UTCP's implementation, affected couples generally experienced reductions in the frequency of these emotions, though the decreases in Restless and Hopeless were not statistically significant. Overall, the results suggest that the parallel-trends assumption is largely satisfied, while the effects of the implementation on specific emotions related to mental health are not consistently significant.

The significantly lower frequencies of specific negative emotions observed among affected couples compared to the control group in 2012 could be attributable to various factors. One is that the scale used to measure negative emotions in 2014 is the only one that is different from the one used in other waves of the CFPS. Although the K6 scale also contains questions that measure the same negative emotions, these questions are expressed slightly differently and cover different lengths of time compared with the ones used in the CES-D eight-item scale. Moreover, although I attempted to convert the 0–4-point K6 scale to the 0–3-point CES-D eight-item scale, the observations of specific emotions in 2014 cannot be considered completely comparable to those in other waves of the CFPS.

Conclusion

For a long time, despite the prevalence of various fertility restrictions around the world, their impacts on mental health status received only limited attention from researchers. Moreover, none of the existing studies have explored the effects of relaxing fertility restrictions on mental health. The UTCP, the first relaxation of the most stringent and influential family planning policy in the world after 35 years, is expected to have profound impacts on various aspects of China, thus providing a valuable opportunity to investigate the effect of the relaxation on mental health. For the first time, this paper investigates the causal relationship between the relaxation of fertility restrictions and mental health by using the implementation of the UTCP in a difference-in-differences approach and adopting a unique identification strategy.

This paper presents empirical evidence showing that the risk of severe mental illness faced by individuals affected by the relaxation fell significantly compared with that of individuals in the control group. Regarding specific negative emotions on the mental-health-symptoms scale, the relaxation reduced the frequency of these emotions in individuals to different extents by providing permission to previously restricted individuals to have a second child. Moreover, this paper uncovers evidence indicating that the relaxation has led to significant improvements in physical health.

Moreover, this paper finds that compared with other respondents, women affected by the relaxation experienced a significant reduction in the frequency of hopelessness. Although affected women's frequency of restlessness was not initially significantly different from that of other respondents following the relaxation, they reported a significant increase two years afterward.

This paper demonstrates that the mental health improvements resulting from the relaxation of fertility restrictions are primarily concentrated among individuals aged 18–30, as reflected in sustained and significant reductions in both the risk of severe mental illness and the frequency of negative emotions. Individuals aged 31 to 40 also experienced mental health improvements to various extents following the relaxation, although these improvements did not persist for two years. This paper finds a significant increase in the frequency of feeling restless among middle-aged and older individuals, potentially because they bear greater responsibility for caring for younger children in the family.

This paper indicates that the positive effects on mental health of relaxing fertility restrictions are primarily driven by couples from less developed regions, evidenced by significant reductions in risk of severe mental illness and in the frequencies of specific negative emotions experienced by these couples. In contrast, significant improvement generally was not observed among affected couples from more developed regions following the relaxation. My findings do not contradict the existing evidence but fill a void by demonstrating that such a relaxation can lead to significant improvements in mental health.

This study is subject to several limitations. Because of limited data availability, the use of different psychiatric scales for respondents' mental health measurements potentially influenced measured outcomes. The mechanisms underlying the positive effects of the UTCP's implementation on mental health status require further exploration. Moreover, further exploration of the causal effects of relaxation of fertility restrictions on mental health across different national contexts is crucial for reaching more universal conclusions.

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