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Original Article

# Enhancing Preconception Care Intentions Among Married Couples with One Child: The Impact of Educational Interventions Based on the Theory of Planned Behavior

**Masoumeh Mareki Mehni[1], Zahra Rastegari[2*], Roksana Janghorban[2]**

[1]School of Nursing and Midwifery, Shiraz University of Medical Sciences, Shiraz, Iran
[2]Department of Midwifery and Reproductive Health, School of Nursing and Midwifery, Shiraz University of Medical Sciences, Shiraz, Iran

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***Corresponding author:**
Zahra Rastegari,
Email: rastegari.zahra2015@gmail.com

## Abstract

**Introduction:** Iran's declining fertility rate from 3.95 in 1990 to 1.36 during 2020–2025 has recently raised demographic and socioeconomic concerns. Educational interventions based on the Theory of Planned Behavior (TPB) can promote intentions for timely preconception care (PCC). Thus, this study evaluated such an intervention among couples with delayed subsequent childbearing.

**Methods:** Using a pre-test/post-test design, this quasi-experimental study was conducted in Jiroft, Iran in 2024. Married couples with one child experiencing delayed subsequent childbearing were recruited from eight healthcare centers randomly assigned to the intervention or control groups (n = 56 couples each). The intervention group participated in eight weekly, 60-minute educational sessions based on the TPB, targeting attitudes, subjective norms, and perceived behavioral control toward PCC. The outcomes were measured using a validated questionnaire, assessing intention to engage in PCC. Finally, data were analyzed using paired and independent t-tests and ANCOVA to evaluate intervention effects.

**Results:** At baseline, participants in the intervention group exhibited moderate-to-low PCC-related scores across awareness (mean ± SD: 11.94 ± 2.13), attitude (37.13 ± 4.10), subjective norms (25.96 ± 3.54), perceived behavioral control (19.04 ± 2.08), and behavioral intention (11.13 ± 1.23). Following the structured educational intervention, the intervention group demonstrated statistically significant and clinically meaningful improvements in all outcomes. Awareness increased by an average of 4.03 points to 15.98 ± 1.01, and attitude improved by 4.33 points to 41.46 ± 3.70. Moreover, subjective norms, perceived behavioral control, and behavioral intention rose by 1.75 points to 27.71 ± 3.46, 3.33 points to 22.37 ± 1.70, and 2.77 points to 13.90 ± 0.89, respectively (all paired $P < 0.001$). These enhancements, absent or minimal in the control group, highlight the efficacy of the intervention in substantially elevating knowledge, positive attitudes, perceived social influence, behavioral control, and intentions toward PCC.

**Conclusion:** The educational TPB-based intervention could significantly improve PCC-related factors and intentions among women with one child and delayed pregnancies. These findings support using theory-driven programs to enhance reproductive health and promote informed childbearing decisions.

**Keywords:** Theory of planned behavior, Married couples with one child, Behavioral intention, Educational intervention, Preconception care

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## Introduction

The global trend toward delayed childbearing and smaller family size has contributed to a sustained decline in fertility rates over recent decades (1). The total fertility rate has dropped from an average of 5.29 children per woman in 1960–1969 to 2.74 in 2010–2020, falling below the replacement level of 2.1 in many countries (2, 3). Iran has experienced one of the most rapid fertility declines globally, with the total fertility rate decreasing from over 6 children per woman in the 1980s to approximately 1.7 in recent years well below the replacement level (4-7). Projections suggest that Iran's fertility rate may further fall to below 1.5 by 2025, raising serious concerns about population aging, labor shortages, and long-term socioeconomic sustainability (8).

The growing preference for one-child families is a

key driver of this decline, particularly among urban and educated couples (9). This trend is associated with various psychosocial challenges for childrensuch as social isolation, reduced sibling support in adulthood, and heightened parental pressure, as well as demographic risks for society, including an imbalanced age structure and increased dependency ratios (10-12). Furthermore, delayed childbearing, especially beyond age 35, is linked to increased risks of infertility, pregnancy complications, and adverse neonatal outcomes (13-17). Despite these risks, many individuals lack accurate knowledge about fertility and reproductive aging, frequently leading to unintended childlessness or limited family size due to postponed parenthood (18-20).

Given these challenges, preconception care (PCC) plays a critical role in optimizing maternal and fetal health by identifying and managing risk factors before pregnancy (21). PCC includes health education, screening, immunizations, nutritional counseling, and management of chronic conditions, all aimed at improving pregnancy outcomes and supporting informed reproductive decision-making (22–24). Despite its importance, PCC awareness and utilization remain low among reproductive-age couples in Iran and other low-income and middle-income countries (25, 26), underscoring the need for effective educational interventions to enhance knowledge, attitudes, and intentions toward this type of care (27).

Behavioral theories provide a robust foundation for designing such interventions. Among them, the Theory of Planned Behavior (TPB) has been widely applied in health promotion research (28, 29). According to the TPB, the behavioral intention for the immediate precursor to action is shaped by (a) attitudes toward the behavior, (b) subjective norms (perceived social pressure), and (c) perceived behavioral control (perceived ease or difficulty of performing the behavior) (30, 31). Numerous studies have demonstrated the predictive power of TPB in vaccination, screening, and reproductive health behaviors (32-34). Educational TPB-based programs have been shown to significantly improve intentions and behaviors related to maternal and child health (35, 36).

Despite the proven utility of TPB in health education, there is a notable gap in research on TPB-based interventions targeting couples' intentions to engage in PCC particularly among those who already have one child and are considering (or postponing) a second pregnancy. Most existing studies have focused on individual women or general reproductive knowledge, rather than dyadic decision-making within couples or the specific motivations of small-family households (37-39). Moreover, few interventions have addressed both the medical and psychosocial dimensions of preconception planning within a theoretical framework (40).

Regardless of the critical role of PCC in promoting maternal and child health, there is a remarkable lack of theory-based interventions focusing on couples with one child who delay subsequent pregnancies. Most previous research has narrowly addressed women individually, overlooking the crucial shared decision-making process within couples. To the best of our knowledge, this study is the first to apply the TPB to a couple-centered educational intervention specifically aimed at enhancing intentions toward PCC in this high-priority group in Iran. Given the urgent need to address delayed childbearing and low fertility rates in the country, this research offers valuable insights by integrating the behavioral theory with reproductive health education. Ultimately, it seeks to support safer motherhood, informed fertility decisions, and national population goals by empowering couples to actively participate in preconception planning.

## Materials and Methods

A quasi-experimental study with a pretest-posttest control group design was performed in Jiroft, Iran, from April to September 2023, involving 112 married couples, each with one child and intentionally postponing further childbearing. This study specifically targeted couples who had voluntarily delayed childbearing in the absence of infertility in order to assess the impact of an educational intervention on their intention to engage in PCC within a context of autonomous reproductive decision-making. Participants were selected through purposive convenience sampling and assigned to the intervention and control groups via cluster randomization at the level of urban health centers to minimize contamination.

### *Inclusion and Exclusion Criteria*

Eligible participants were Iranian couples aged 20–49 years, literate, residing in Jiroft, and in a monogamous relationship with at most one child. They had a minimum four-year interval since their last pregnancy, no medical contraindications for re-pregnancy, no history of treated secondary infertility, and active health records at local centers. Moreover, they were required to be free from physical, mental, or sexual illnesses, have not using psychiatric medications, narcotics, or alcohol, and be willing to provide informed consent. The exclusion criteria included unwillingness to continue participation, missing of more than two educational sessions, divorce, incomplete questionnaires, relocation, or enrollment in similar educational programs.

### *Sample Size and Randomization*

The sample size was calculated based on a prior study by Alami et al (41), using a mean difference of 1.4, standard deviations of 2.49 and 2.41, 80% power, and a 5% margin of error, yielding 48 couples per group. Considering a 10% attrition rate, the final sample size was set at 56 couples per group (N = 112). Two health centers were randomly allocated to the intervention and control groups. Then, a pilot study was conducted with 10 couples (5 per group) to evaluate the feasibility and clarity of the instruments and intervention. Minor revisions were made to simplify medical terminology in the educational booklet and rephrase ambiguous questionnaire items. Cronbach's alpha values (0.68–0.77) confirmed acceptable reliability,

and no major logistical issues were identified.

### Data Collection Instruments

Data were collected using a demographic questionnaire and a standardized instrument based on the TPB. The instrument included 17, 10, 7, 5, and 3 items on knowledge of PCC, attitudes, subjective norms, perceived behavioral control, and behavioral intention, respectively, and 1 item measuring intention to engage in PCC. Content validity was established by a panel of eight faculty members from the Midwifery and Reproductive Health Department at Fatemeh (SA) Nursing and Midwifery School, Shiraz. In addition, content validity ratio and content validity index were calculated, with thresholds of ≥ 0.75 and ≥ 0.79 for content validity ratio (Lawshe's table) and content validity index, respectively. All items met or exceeded these criteria, confirming content validity. Reliability was assessed via Cronbach's alpha, yielding coefficients of 0.73 (knowledge), 0.75 (attitude), 0.68 (subjective norms), 0.77 (perceived behavioral control), and 0.76 (behavioral intention), with an overall reliability of 0.70 for the entire instrument.

### Intervention

The intervention group received an 8-week TPB-based educational program delivered in eight 90-minute weekly sessions at health centers. Each session focused on one chapter of a structured educational booklet developed using national reproductive health guidelines and authoritative sources, including Williams Obstetrics (42) and Berek and Novak's Gynecology (43). Moreover, teaching methods included lectures, group discussions, Q&A, slide presentations, and educational videos, designed to actively engage couples. It is noteworthy that emphasis was placed on shaping attitudes, reinforcing subjective norms, and enhancing perceived behavioral control. The couples were provided with a booklet highlighting the benefits of PCC and the potential psychosocial and demographic challenges of one-child families and then encouraged to share it with family and friends to strengthen social support. However, the control group received no intervention during the study period but was offered the educational materials afterward.

### Data Analysis

Pre-intervention and post-intervention data were collected via self-report questionnaires. Then, data were coded, entered into SPSS (version 16), and analyzed using descriptive statistics (means, SDs, frequencies, and percentages). Normality was assessed using skewness and kurtosis. Additionally, paired t-tests and independent t-tests were utilized to evaluate within-group changes and compare between-group differences, respectively, and the analysis of covariance (ANCOVA) was used to adjust for baseline scores. Finally, chi-square test was applied for categorical variables, and statistical significance was set at $P < 0.05$.

## Results

A total of 104 married couples participated in this randomized controlled trial, with 52 assigned to the intervention group and 52 to the control group. The mean age of the participants was 30.12 ± 4.15 years, ranging from 22 years to 47 years. Due to job relocation, missing educational sessions, spousal loss, and pregnancy, eight couples were excluded, resulting in a final sample of 96 couples (48 per group).

Table 1 provides the baseline characteristics of participants. No significant differences were found between the intervention and control groups regarding age, education level, economic status, duration of marriage, history of abortion, or contraceptive methods (all $P > 0.05$). The participants' education was categorized into two groups, with 66.4% holding a bachelor's degree or higher. Further, most women were housewives, and the majority (72.1%) reported average economic status. Furthermore, the average duration of marriage was approximately 9 years. The use of the intrauterine device

**Table 1.** Demographic and Baseline Characteristics of Participants in the Intervention and Control Groups (N = 104)

| Variable | Total (n = 104) | Intervention Group (n = 52) | Control Group (n = 52) | *P*-Value |
|---|---|---|---|---|
| Age, years (mean ± SD) | 30.12 ± 4.15 | 30.76 ± 4.26 | 29.49 ± 3.98 | 0.725 |
| Education level (%) | | | | 0.833 |
| - Diploma/associate or lower | 33.6 | 36.6 | 30.8 | |
| - Bachelor's degree or higher | 66.4 | 63.4 | 69.2 | |
| Economic status (%) | | | | 0.522 |
| - Poor | 8.7 | 9.6 | 7.7 | |
| - Average | 72.1 | 67.3 | 76.9 | |
| - Good | 19.2 | 23.1 | 15.4 | |
| Duration of marriage, years | 9.02 ± 2.71 | 9.85 ± 2.46 | 8.51 ± 2.59 | 0.104 |
| History of abortion (%) | 11.5 | 15.4 | 7.7 | 0.741 |
| Contraceptive method (%) | | | | 0.240 |
| - IUD | 42.3 | 36.5 | 48.1 | |
| - Other methods | 57.7 | 63.5 | 51.9 | |

*Note:* IUD: Intrauterine device; SD: Standard deviation.

was the most common contraceptive method (42.3%). These findings indicated successful randomization and baseline comparability between the groups, supporting the validity of subsequent intervention analyses.

PCC awareness, attitudes, subjective norms, perceived behavioral control, and behavioral intention were assessed before and after the intervention. All outcomes were analyzed using independent *t*-tests, paired *t*-tests, and ANCOVA with baseline scores as covariates. The intervention group demonstrated significantly greater improvements compared to the control group across all psychosocial constructs related to PCC (Table 2). After the intervention, the intervention group scored remarkably higher in awareness (15.98 vs. 13.69), attitudes (41.46 vs. 35.23), subjective norms (27.71 vs. 24.17), perceived behavioral control (22.37 vs. 18.31), and behavioral intention (13.90 vs. 11.06) (all $P<0.001$). Moreover, mean changes in scores were consistently higher in the intervention group, and ANCOVA confirmed the significant effect of the intervention after adjusting for baseline scores (all $P<0.01$).

### *Preconception Care Awareness*

There was a small but significant baseline difference in awareness scores between groups ($P=0.023$), with the control group scoring slightly higher. However, after the educational intervention, the intervention group showed a substantial increase in awareness (mean change: $4.03\pm1.50$), significantly outperforming the control group ($0.82\pm0.80$, $P<0.001$). The post-intervention mean awareness score was $15.98\pm1.01$ in the intervention group versus $13.69\pm1.62$ in the control group ($P<0.001$). Paired *t*-tests revealed significant within-group improvements in both groups ($P<0.001$). ANCOVA, adjusting for baseline scores, also confirmed a significant intervention effect (adjusted mean difference: 2.79, $P<0.001$, Table 2).

### *Preconception Care Attitude*

At baseline, the intervention group had a significantly higher attitude score ($37.13\pm4.10$ vs. $34.69\pm3.55$, $P=0.002$). After the intervention, attitude scores increased to $41.46\pm3.70$ in the intervention group compared to $35.23\pm3.53$ in the control group ($P<0.001$). Likewise, the mean change was significantly greater in the intervention group ($4.32\pm0.96$ vs. $0.53\pm0.69$, $P<0.001$). Both groups demonstrated considerable within-group improvements ($P<0.001$). Ultimately, ANCOVA confirmed the significant impact of the intervention (adjusted mean difference: 3.98, $P=0.001$, Table 2).

### *Subjective Norms*

The scores of baseline subjective norms were noticeably higher in the intervention group ($25.96\pm3.54$ vs. $23.81\pm3.02$, $P=0.001$). Post-intervention, the intervention group scored $27.71\pm3.46$, while the control group received a score of $24.17\pm2.86$ ($P<0.001$). Similarly, the mean change was $1.75\pm0.86$ in the intervention group versus $0.36\pm0.47$ in the control group ($P<0.001$). Based on paired *t*-test results, tehre were significant improvements in both groups ($P<0.001$), and ANCOVA results revealed a statistically significant intervention effect (adjusted mean difference: 1.51, $P<0.001$, Table 2).

### *Perceived Behavioral Control*

Baseline perceived behavioral control was slightly higher in the intervention group ($19.04\pm2.08$ vs. $18.10\pm2.42$, $P=0.036$). After the intervention, the intervention group scored $22.37\pm1.70$, significantly higher than that of the control group ($18.31\pm2.42$, $P<0.001$). In addition, the mean improvement was $3.32\pm0.85$ versus $0.21\pm0.41$ in the intervention and control groups ($P<0.001$). Both groups significantly improved within themselves ($P<0.001$). ANCOVA proved the extensive and significant influence of the intervention (adjusted mean difference: 3.22, $P<0.001$, Table 2).

### *Behavioral Intention and Decision-Making*

At baseline, there was no significant difference in behavioral intention scores between the groups ($P=0.158$). Following the intervention, however, the intervention

**Table 2.** Comparison of Preconception Care Outcomes Between the Intervention and Control Groups (N = 96 )

| Outcome | Group | Baseline Mean ± SD | Post-Intervention Mean ± SD | Mean Change ± SD | Between-Group *P*-Value* | ANCOVA Adjusted Mean Difference | ANCOVA *P*-Value |
|---|---|---|---|---|---|---|---|
| Awareness score | Intervention | 11.94 ± 2.13 | 15.98 ± 1.01 | 4.03 ± 1.50 | <0.001 | 2.79 | <0.001 |
| | Control | 12.87 ± 1.93 | 13.69 ± 1.62 | 0.82 ± 0.80 | | | |
| Attitude score | Intervention | 37.13 ± 4.10 | 41.46 ± 3.70 | 4.32 ± 0.96 | <0.001 | 3.98 | 0.001 |
| | Control | 34.69 ± 3.55 | 35.23 ± 3.53 | 0.53 ± 0.69 | | | |
| Subjective norms | Intervention | 25.96 ± 3.54 | 27.71 ± 3.46 | 1.75 ± 0.86 | <0.001 | 1.51 | <0.001 |
| | Control | 23.81 ± 3.02 | 24.17 ± 2.86 | 0.36 ± 0.47 | | | |
| Perceived behavioral control | Intervention | 19.04 ± 2.08 | 22.37 ± 1.70 | 3.32 ± 0.85 | <0.001 | 3.22 | <0.001 |
| | Control | 18.10 ± 2.42 | 18.31 ± 2.42 | 0.21 ± 0.41 | | | |
| Behavioral intention | Intervention | 11.13 ± 1.23 | 13.90 ± 0.89 | 2.76 ± 0.73 | <0.001 | 2.59 | <0.001 |
| | Control | 10.79 ± 1.24 | 11.06 ± 1.17 | 0.66 ± 0.44 | | | |

*Note*: SD: Standard deviation; ANCOVA: Analysis of covariance. Between-group *P*-values correspond to the comparisons of post-intervention scores or mean changes, as appropriate. Significant improvements within both groups (paired t-tests, $P<0.001$) are not shown here for brevity. All post-intervention between-group comparisons were statistically significant ($P<0.001$) after adjusting for baseline values using ANCOVA.

group showed a marked increase (13.90 ± 0.89 vs. 11.06 ± 1.17, $P < 0.001$), with a mean change of 2.76 ± 0.73 compared to 0.66 ± 0.44 in the control group ($P < 0.001$). ANCOVA results revealed the the significant effect (adjusted mean difference: 2.59, $P < 0.001$, Table 2).

After the intervention, all participants in the intervention group (100%) decided to pursue PCC, a statistically significant increase compared to only 26.9% of participants in the control group ($P < 0.001$). Before the intervention, decision rates were not significantly different between the groups (15.4% vs. 7.7%, $P = 0.220$). Within-group analysis using the McNemar test revealed significant shifts in decision-making in both groups ($P < 0.001$ and $P = 0.002$ for the intervention and control groups, respectively), with the magnitude of change markedly greater in the intervention group. These results indicated that the educational intervention had a substantial impact on participants' intentions to engage in PCC (Table 3).

## Discussion

Our results demonstrated a significant enhancement in the intention to engage in PCC among married couples with one child who had delayed childbearing, following an educational intervention based on the TPB. This intervention effectively improved women's awareness, attitudes, subjective norms, and perceived behavioral control, leading to a marked increase in their intention to pursue PCC. Notably, the findings emphasized that educational programs targeting the three core constructs of the TPB attitudes, subjective norms, and perceived behavioral controlcan positively influence these determinants, thereby fostering greater engagement in PCC. Moreover, these improvements are especially relevant for couples experiencing delays in family expansion, underscoring the potential of theory-driven educational strategies to promote healthier reproductive behaviors. The results of this study are consistent with those of previous studies conducted by Stegen et al in Ethiopia (44), Tena et al in the Southern Ethiopia (45), and Vakilian et al in Iran (46), all demonstrating that TPB-based educational interventions could significantly improve attitudes, subjective norms, and perceived behavioral control related to PCC among women. Similarly, these findings align with those of Khorsandi et al, identifying individuals' attitudes and subjective norms as the strongest predictors of their intention to engage in PCC behaviors (47).

Fetena et al investigated the utilization of PCC and its determinants among pregnant mothers in Fiche Town, Central Ethiopia. Their results demonstrated several key factors that significantly influenced the use of PCC, including possessing a diploma or higher educational level, receiving psychological and financial support from a partner through joint discussions and planning, and having adequate knowledge about PCC. Pregnant mothers with higher education, strong spousal support, and sufficient knowledge were more likely to access and employ PCC services (48), which corroborates our results, emphasizing the crucial role of education and partner support in promoting PCC among expectant mothers.

Likewise, Bayrami et al identified key predictors of PCC utilization among reproductive-age women in Urmia, using the BASNEF model as the theoretical framework. Based on their findings, the BASNEF model constructs explained 42% of the variance in women's intention to seek PCC. Notably, enabling factors and attitudes emerged as the most significant determinants shaping behavioral intentions. Moreover, both intention and enabling factors were identified as critical predictors of actual PCC utilization. These findings underscore the need to develop targeted interventions that enhance women's attitudes, strengthen their intentions, and improve enabling conditions to promote proactive health behaviors in this population (49).

Consistent with previous research, our study demonstrated that educational interventions based on the BASNEF model significantly improved attitudes, subjective norms, and perceived behavioral control, leading to increased awareness and stronger intentions among couples to engage in PCC. This alignment confirms the effectiveness of theory-driven educational strategies in promoting positive health behaviors among reproductive-age couples. Furthermore , the primary objective of the TPB model to predict and influence couples' behavioral intentions regarding PCC was successfully achieved through our targeted educational intervention. Additionally, the TPB-based approach markedly enhanced couples' motivation and readiness to seek PCC, indicating the importance of integrating behavioral theories into health promotion programs.

The constructs of attitudes, subjective norms, and perceived behavioral control have consistently emerged as the most influential predictors of women's intention to utilize PCC services. These findings conform to those of Khoshniat et al (46) and Torkian Valashani et al in

**Table 3.** Decision-Making Regarding Preconception Care Before and After the Intervention (N = 104)

| Decision for Preconception Care | Group | Before Intervention, n (%) | After Intervention, n (%) | Within-Group *P*-Value (McNemar Test) |
|---|---|---|---|---|
| Yes | Intervention | 8 (15.4) | 52 (100) | < 0.001 |
| | Control | 4 (7.7) | 14 (26.9) | 0.002 |
| No | Intervention | 44 (84.6) | 0 (0) | |
| | Control | 48 (92.3) | 38 (73.1) | |
| Between-group comparison (after intervention) | | | | < 0.001 |

Iran (37), representing attitudes and subjective norms within the TPB framework as the primary determinants shaping women's intentions to seek PCC. Further, this pattern is supported by international research, including studies performed by Aziz et al (50), Dommermuth et al (51), Annadurai et al (52), and Setyorini et al (53), similarly emphasizing the critical role of these factors in preconception health behaviors. Collectively, these results highlight the universal applicability of the TPB model in understanding and predicting PCC intentions across diverse cultural contexts. These studies employed the TPB to explore the key determinant factors women's utilization of PCC. The findings revealed significant differences in awareness, attitudes, subjective norms, and behaviors between the intervention and control groups following the implementation of TPB-based interventions. Overall, the evidence confirms the effectiveness of this framework in strengthening women's behavioral intentions toward engaging in PCC, underscoring the theory's critical role in enhancing awareness, shaping positive attitudes, and increasing perceived behavioral control related to PCC services.

Jafarpour et al evaluated the impact of a health education TPB-based intervention. This intervention aimed to promote physical health among women attending health centers (54). The results of their study contradict those of the present study. Their intervention did not succeed in increasing awareness or effecting significant changes in attitudes and behaviors. This inconsistency may be attributed to differences in intervention design and participant characteristics.

In contrast, our educational intervention was intentionally designed to empower participants by fostering a sense of capability to engage in PCC, emphasizing that such care is accessible without requiring extensive resources or financial burden. It is believed that a more holistic approach, involving both men and women, can positively influence their intentions and behaviors toward PCC. Although a review of the current literature reveals a notable gap in interventional studies assessing the effectiveness of educational programs on PCC among married couples with one child who delay subsequent childbearing, the TPB has been consistently validated over the years as a robust framework for designing educational interventions aimed at modifying health behaviors (53). This underscores the potential of TPB-based programs to effectively influence preconception health practices. Therefore, future research should focus on developing and evaluating comprehensive, couple-centered educational interventions grounded in the TPB framework to address this critical gap and promote healthier reproductive outcomes. This study contributes to the literature by demonstrating the effectiveness of a TPB-based educational program in a unique and understudied population, married couples with one child who have postponed further childbearing. It is noteworthy that the inclusion of both partners, the focus on intention as a precursor to behavior, and the application of a well-established behavioral theory in a community-based setting represent key strengths and novel aspects of this work.

## Conclusion

Our findings demonstrated that TPB-based education significantly enhanced awareness, fostered positive attitudes, and strengthened behavioral intentions toward PCC among married couples with one child who delayed subsequent childbearing. By targeting key psychological factors (e.g., perceived behavioral control and subjective norms), the intervention effectively motivated couples to engage in PCC. In the context of Iran's population challenges and the increasing prevalence of single-child families, educational programs like this can play a vital role in boosting intentions for PCC, thereby supporting national population goals. However, considering the complex social and cultural factors influencing childbearing decisions, further research is needed to better understand the role of TPB constructs in shaping these intentions.

## Strengths and Limitations of the Study

This study had several important strengths. First, it is among the first to specifically target married couples with one child who have delayed subsequent childbearing, a key population in the context of declining fertility rates and national population policies. This focus enhances the relevance of the findings for reproductive health programming and policy development. In addition, the educational intervention was theoretically grounded in the TPB, providing a structured and evidence-based framework to understand and influence behavioral intentions toward PCC. The use of a validated and reliable questionnaire (developed by Khorsandi in 2012) further strengthens the validity of the measurements. Moreover, the quasi-experimental design with a control group and pre-test and post-test assessments allowed for a robust evaluation of the intervention's impact, while statistical methods, such as ANCOVA, helped control for baseline differences and increase the precision of the results. Finally, the intervention was delivered in a real-world primary healthcare setting, enhancing its practical applicability and potential for integration into routine maternal and child health services.

However, the study had several limitations. First, the non-random allocation of participants at the individual level (despite the random assignment of health centers) and the use of convenience sampling may have introduced selection bias and limited the internal validity of the findings. Further, the sample was drawn from a single geographic region (Jiroft), which may have limited the generalizability of the results to other cultural or socioeconomic contexts within Iran or beyond. Furthermore, all outcomes were self-reported, which may have been influenced by social desirability bias or recall bias, particularly in measures related to attitudes and intentions. Additionally, the follow-up assessment was

conducted immediately after the intervention; thus, the long-term sustainability of the observed improvements in intentions and related constructs remains unknown. Finally, although data were collected from both spouses, the analysis was performed at the individual level, and no dyadic or couple-level analysis was conducted, potentially overlooking interpersonal dynamics that may influence PCC decision-making.

Accordingly, future research should employ randomized controlled trial designs, extend the follow-up period to assess behavioral changes over time, and incorporate objective indicators of PCC uptake. Eventually, dyadic analyses and multi-center studies across diverse regions would further strengthen the evidence base.

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**Authors' Contribution**

Conceptualization: Zahra Rastegari, Roksana Janghorban.
Data Curation: Zahra Rastegari, Masoumeh Mareki Mehni.
Formal Analysis: Zahra Rastegari.
Investigation: Zahra Rastegari, Masoumeh Mareki Mehni.
Methodology: Zahra Rastegari, Roksana Janghorban.
Project Administration: Zahra Rastegari.
Resources: Zahra Rastegari, Roksana Janghorban, Masoumeh Mareki Mehni.
Software: Zahra Rastegari.
Supervision: Zahra Rastegari, Roksana Janghorban.
Validation: Roksana Janghorban.
Visualization: Zahra Rastegari.
Writing – Original Draft: Zahra Rastegari, Masoumeh Mareki Mehni.
Writing – Review & Editing: Zahra Rastegari, Roksana Janghorban, Masoumeh Mareki Mehni.

**Competing Interests**

The authors declare they have no conflict of interests.

**Ethical Approval**

This study was confirmed by the Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC27625). In addition, written consent was obtained from research units. Further, participants were assured of data confidentiality and received a full explanation of research objectives. Likewise, they had the right to withdraw from the study at any time. Furthermore, the necessary measures were anticipated to be prepared for the reception of participants, and the training package was considered for awarding in order to appreciate the participants of the control group.

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