

## Examination of the Effects of a Program Focusing on the Continuation of Reinforcement Programs for Couples in the Low-Co-Parenting Group who are in the Childrearing and Pregnancy Period

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### Abstract

A preliminary survey on the implementation of a program to promote parenting by couples suggested that the idea of “parental involvement in education” positively affected parenting by couples. In response to these findings, we discussed “parental involvement in education” in the preliminary program and confirmed its effects on couples in the childrearing and pregnancy stages.

In the program implementation survey, we focused on the groups that had continued the program for 1 month and those that had not and looked at the changes at three timepoints: before, immediately after, and 1 month after the program.

The program was evaluated in terms of changes in the subscales of the couple parenting awareness scale— “emotional support for each other”, “concrete support for each other”, “difficulty in sharing responsibility”, and “agreement and negotiation in child-rearing”—and the effects of the program on attachment to the child and the Edinburgh postnatal depression scale (EPDS). The number of valid responses was 42 during pregnancy (21 women,  $29.2 \pm 2.7$  years old; 21 men,  $30.3 \pm 2.1$  years old) and 278 during childrearing (128 women,  $32.3 \pm 4.0$  years old; 150 men,  $33.8 \pm 3.4$  years old).

The program significantly improved the scores on the subscale of the parental attitudes scale immediately after the program; however, the effect was influenced by whether the program was continued after 1 month. The increase in fathers’ awareness of their participation in education positively affected couple parenting, and the inhibition of attachment to children and decrease in EPDS scores were the result of multiple factors working together. The factor believed to have contributed to this was the continuation of the program, and the factors contributing to program continuation were remembering the content of the program and being conscious of it. Furthermore, more significant effects were observed in subjects in the childrearing period than in those in the pregnancy period.

**Keywords:** Co-parenting; Program; Couples; Parenting; Pregnancy

### Introduction

As an indicator of the direction and structure of changes in marriage since the birth of a child, Jay Belsky and John Kelly [1] classified couples into six categories based on the combination of traditional, intermediate, and egalitarian types of men and women and established six transition areas (i.e. self, sex ideology, emotional tendencies, expectations, communication, and friction management) that determine the quality of marriage. The book looks at what happens during the transition from being a couple to being parents, focusing on typical examples of how the quality of the marriage improves, remains the same, or worsens based on a detailed analysis of the impact of the

birth of a child on the couple over a 7-year period from the first pregnancy. Recently, the shape of the family has been changing, with the trend toward nuclear families and more couples working together, and the importance of building up a relationship between the two of you before having children has been highlighted. When a child is born, the relationship between the parents also enters a new stage in life, the so-called transition period. Building a relationship between the parents through childrearing during this important period can be considered an important theme.

Research on couple parenting has been conducted in the United States since the 1990s, and it is considered to be an activity shared by multiple caregivers who are broadly responsible for the care and upbringing of a child [2] and how parents should work together as parents [3]. Nowadays, there is a focus on the importance of parenting through the cooperation of a married couple and on married parenting, and in Japan, research on married parenting is being conducted and targets couples during the pregnancy and childrearing periods [4-7]. However, considering Japan and overseas, knowledge on programs to improve couple parenting for parents raising children remains inadequate.

In a previous study by the author, which was funded by a MEXT grant-in-aid for scientific research, it was confirmed that increasing couple parenting increases the happiness of childrearing, while simultaneously reducing childrearing stress and increasing the time spent on childrearing and promoting childrearing behavior [8]. A significant relationship was observed between couple parenting and the amount of time spent on childcare, the number of children, the age of the children, and the discussion of childcare responsibilities before childbirth. Furthermore, it was suggested that discussing the characteristics of childcare according to the age of the child and childcare responsibilities from the pregnancy period and answering the short version of the Couple Parenting Awareness Scale would increase awareness of childcare cooperation and positive childcare behavior [9].

Based on the results of these previous studies, we examined a program for couples in the postpartum crisis period of childrearing to promote parenting among couples in the childrearing period, and as a first step, we conducted a pre-survey in 2023. Scale score changes after the impressions of the program, the approach to the program, and the program's approach were confirmed to be significantly higher in the low group. A significant decrease was observed in the high group; however, because the evaluation was high to begin with, it was believed that a reasonable adjustment had been made.

Furthermore, there was a significant relationship with couple parenting in 7 of the 20 items in the "father's participation in education" that the husband considered. Thus, it was suggested that the father's beliefs on participation in education positively affected couple parenting. Furthermore, the number of housework activities performed by the husband was significantly higher in the high and medium groups than in the low group in terms of scores for perceptions of couple parenting [10].

Therefore, we decided to conduct this survey again and divide the participants into two groups: one that continued the program for 1 month and one that did not. Furthermore, we focused on changes at three timepoints: before, immediately after, and 1 month after the program. The program specifically examines the direction of support in the 15-item shortened version of the marital parenting scale, which comprises four subscale items. This scale focuses on the positive factors of "mutual emotional support", "mutual emotional support", and "agreement and negotiation on childrearing" and the negative factor of "difficulty in sharing responsibility". In response to feedback on the previous program, many positive comments were made. The content of the program will not be changed this time because the participants were aware of the changes in their relationship for the better, realized how to improve it concretely, developed feelings of consideration for their partner, realized the difficulty of childrearing, realized the difficulty of their wife and the cuteness of their child, and were able to reaffirm the differences between husband and wife. As a new addition, in response to the finding that the higher the awareness of the "effect of fathers' participation in education" following the previous intervention, the higher the score for the couple's parenting, we discussed "fathers' participation in education" for the couples in advance. In addition to the measures during the

childrearing period, we requested the subjects who were in the pregnancy period to participate in the program and decided to confirm the effects of the measures taken at an early stage. Because couple parenting has been suggested to exert a positive effect on depression symptoms [5], we added the Edinburgh postnatal depression scale (EPDS) to the survey items. Furthermore, because couple parenting has been shown to exert a positive effect on mothers and fathers themselves, we added an item to assess the attachment to the child, which specifically evaluates the relationship of the parents with the child. We believe that these evaluation items provide a new perspective for capturing the characteristics of the low group in terms of the so-called couple parenting perception scale score.

Improving the scores for couple parenting of the couples in the low group is an important issue, and we focused on the continuation of the program, as we report here. We will continue to work on the development of more effective programs and their dissemination.

### Research Objectives

This study examined the effects of a program that included a discussion of the effects of fathers’ participation in education to further promote couple parenting. In particular, the study focused on the continuation of the program, and the purpose was to implement and examine the program for couples in the pregnancy and childrearing periods.

### Materials and Methods

#### Program to promote couple parenting

Based on the 15-item, 4-factor scale for assessing couples’ perceptions of parenting, which includes four items on “mutual emotional support”, four items on “mutual concrete support”, three items on “agreement and negotiation in childrearing”, and four items on “difficulty in sharing responsibilities” [11], a shortened version of the scale was developed [8,9], and programs 1-4 were designed to allow couples to work on the content from four perspectives. Table 1 presents the specific aims and content. In this intervention, a discussion between couples about “father’s participation in education” was added to the first stage of the implementation of programs 1-4.

Table 1: Aims and content of the couple parenting promotion program

Four perspectives	Aims	Content
I Emotional support for each other	1.Worrying about	Greeting with a smile and finding out how things are going on a day-to-day basis
	2.Knowing what they want	Say and listen to what you really think in order to relieve anxiety, dissatisfaction and worries
	3.Compassion	Treat them warmly and take care of them with compassion
	4.Listening	Understand and know the other person’s feelings
II Concrete support for each other	1.Help with housework and childcare naturally	Think from the other person’s perspective Cooperate with their hardships and efforts
	2.Help and be considerate so as not to irritate them	Take the initiative and try things out. Don’t forget to say thank you.
	3. Always think of better ways to do things with motivation	Talk to them and ask if they are having any problems. Ask if they are feeling stressed or tired.
	4.Cooperate with everything without complaining	Think about their usual behavior and words. Let them know you are willing to help, and do things together as much as possible.
III Agreement and negotiation on child-rearing	1.Watch out for each other and talk about it on the spot.	We should make time for each other and try to spend time together.
	2.Communicate your feelings and opinions to the other person.	we won’t understand.
	3.Even if you are given a task, listen to the other person’s opinions and report back.	We should be able to talk about anything and have a relationship that won’t break even if we have a fight. We should communicate our intentions to each other and share information.
IV Difficulty in sharing cooperation between husband and wife as they responsibility are.	1.We should not leave things that hinder cooperation between husband and wife as they are.	Differences in values are just differences in the way we think and the priorities we value. There is no need to make them the same or to criticize them.
	2.We should talk about and consult about our feelings.	There is no need to make them the same or to criticize them. If you are worried about whether there are any new difficulties, talk about it. Even if it turns into a fight, that’s fine.

\* Before the program starts, the couple should have a discussion about “parental involvement in education”

**Research method**

In addition to a questionnaire survey conducted by an Internet research company (Freeasy), we asked Freeasy to present and implement the program.

**Survey subjects**

The survey subjects were husbands or wives who were expecting their first child, those who were either pregnant themselves or whose spouse was pregnant, and those who were expecting to give birth between August and December of the same year (hereafter referred to as the “pregnancy period”) and husbands or wives who had children aged ≤5 years (hereafter referred to as the “childcare period”). From the four subscales of the parenting perception scale, those who scored below the 25<sup>th</sup> percentile in one or more items were targeted for the survey.

**Survey overview**

To select the survey participants, a preliminary survey was performed in the childrearing and pregnancy periods, targeting individuals aged 25-38 years, and a shortened version of the survey on the perceptions of couple parenting and perceptions of the importance of fathers’ participation in childrearing was performed simultaneously.

Two weeks after the preliminary survey, the first main survey was performed. Images describing the content of the couple parenting program and its implementation points were uploaded, and the participants were encouraged to implement the program for 1 week. One week after the first survey, the second main survey was performed, and 1 month later, the third main survey was performed. Table 2 presents the survey period, survey content, number of surveys, and number of responses, among others, for the three surveys.

Table 2: Survey period and content.

Survey	Pregnancy			Childrearing period			
	Survey period Survey content	Distribution Collection	Survey period Survey content	Distribution Collection	Survey period Survey content	Distribution Collection	
Preliminary survey	28 June 2024–30 June 2024	Wives 500 Husbands 500	500 500	July 1, 2024–July 2, 2024	Wives 500 Husbands 500	500 500	
	Whether the wife is pregnant or not and the expected month of birth Shortened version of the couple parenting awareness scale Importance of the educational and participative effects of fathers			Age and number of children of father and child, whether wife is pregnant or not Shortened version of the couple parenting awareness scale Importance of the educational and participative effects of fathers			
First time	26 July 2024–2 August 2024	Wives Husbands	33 28 27	28 23	July 26, 2024–August 2, 2024	Wives 201 Husbands 191	155 177
	Pondering (feelings towards the child) Marital discussions • Husband’s participation in housework, childcare, etc. • Taking childcare leave, etc. • Effect of father’s participation in education • Review of marital parenting • Explanation and images of marital parenting initiatives				Pondering (feelings towards the child) Marital discussions • Husband’s participation in housework, childcare, etc. • Taking childcare leave, etc. • Effect of father’s participation in education • Review of marital parenting • Explanation and images of marital parenting initiatives • Marital communication		
Second time	August 9, 2024–August 22, 2024	Wives Husbands	28 27	23	August 9, 2024–August 22, 2024	Wives 155 Husbands 177	140 163
	Shortened version of the couple parenting awareness scale Evaluation of the program’s efforts				Shortened version of the couple parenting awareness scale Evaluation of the program’s efforts Actual situation of fathers’ educational participation		
Third time	September 18, 2024–October 1, 2024	Wives Husbands	27 21	23	September 18, 2024–October 1, 2024	Wives 140 Husbands 163	128 150
	Couple parenting approach afterwards Shortened version of the couple parenting awareness scale Importance of the educational effectiveness of fathers’ participation Pondering (feelings towards the baby)				Subsequent to the couple parenting approach Shortened version of the couple parenting awareness scale Importance of the educational effectiveness of fathers’ participation Pondering (feelings towards the child) Edinburgh Postnatal Depression		

## The scale and survey items used in the survey

### Shortened marital parenting perception scale

The marital parenting perception scale comprises 29 items that measure couples' perceptions of their parenting together and is divided into four subscales: "consideration and appreciation for the other person", "willingness to help and words and actions", "communication between couples", and "things that inhibit marital parenting" [11]. A survey was then performed using the marital parenting perception scale, and as a result of confirmatory factor analysis, the factor names and number of items (Cronbach's alpha coefficient) were as follows: "mutual emotional support" (4 items, 0.84), "mutual concrete support" (4 items, 0.82), "agreement and negotiation on childrearing agreement and negotiation" (3 items, 0.73), and "difficulty in sharing responsibilities" (4 items, 0.77), making it a shortened version of the couple parenting perception scale comprising 15 items and four factors [9]. Each item was rated on a 5-point scale from "1. Not applicable" to "5. Applicable". This scale can be used to determine the level of awareness of parenting among couples; a higher score indicates a higher level of awareness of parenting among couples.

### Father's educational participation scale

In the preliminary survey, "father's educational participation" was found to affect a child's growth (kodomo-manabi-labo.net, website); therefore, the husbands were instructed to select the corresponding value on a 5-point scale from 1 to 5, with "not at all important" as 1 and "very important" as 5, for 19 items listed as the effects of father's educational participation. To confirm the commonality and factors of the items affecting children's growth, an exploratory factor analysis was performed using the maximum likelihood method and the rotated Promax method based on the valid responses (230 wives and 187 husbands) from the pregnancy period (the respondent or spouse is pregnant) and the childrearing period (there are children aged  $\leq 5$  years). The results of the exploratory factor analysis of the 15 items and two subscales were as follows: 10 items—"It has become more common for fathers to participate in childcare", "The mutual respect and trust between fathers and mothers leads to the emotional stability of children", "It is important for fathers to praise and show their appreciation for their mothers in front of their children", "Knowing what your children like can be a good opportunity to communicate with them and understand their feelings", "To fully develop the potential of children, it is important for fathers to be actively involved in childcare", "even if it is difficult to have dinner together every day, it is a good idea to go home early a few times a week and have dinner while enjoying conversation with your child", "when fathers interact with their children through play, the child's sense of trust in the father becomes stronger, leading to mental stability", "if fathers also actively participate in childcare, the child will receive more influence from the father and have more opportunities to learn", and "for the sake of the child, the wife, and themselves, mothers and fathers should share the burden of childrearing and housework"—were defined as "effects on children" (Cronbach's alpha coefficient: 0.91), and five items—"Fathers are role models for children in terms of how to be a working adult", "Seeing fathers enthusiastically performing housework and work gives children the chance to learn about the joy of work", "By actively participating in childcare, fathers will be able to work more efficiently and finish their work early so that they can spend more time with their children", and "If fathers eat a good breakfast, their children will also develop the habit of eating a good breakfast"—were defined as "effects on children's social skills" (Cronbach's alpha coefficient: 0.89). These items were used to create a scale to measure the effects of fathers' participation in education. A higher score indicates that fathers have greater knowledge and understanding of how to make correct decisions regarding their child's development.

### Scale for assessing attachment disorders in children

Because no scale can be used during the pregnancy and childrearing periods, an appropriate scale for the period was used.

#### During pregnancy

A scale developed by Brockington, *et al.* [12] was used to measure bonding between mothers and their unborn children. This scale was translated into Japanese with the permission of the original authors [13]. The survey comprises 17 items that measure feelings toward the

baby to ensure a safe delivery, and respondents choose the answer that best reflects their feelings over the past week, from a 6-point scale ranging from “always” to “never”. It assesses four factors: general (10 items), rejection and pathological anger (3 items), anxiety (2 items), and early abuse (2 items). Higher scores indicate that more opportunities for bonding with children were inhibited.

### **Childrearing period**

The bonding scale [14] is used to examine the effects of maternal and child health programs, and the ten questions that assess the burden of childrearing and feelings toward the child are used to assess negative feelings and the presence or absence of the risk of abuse. The total score (0 points for “I almost always feel strongly like this”, 1 point for “I sometimes feel strongly like this”, 2 points for “I sometimes feel a little like this”, and 3 points for “I never feel like this”) can reach 30 points. Higher scores indicate stronger negative feelings toward the child.

### **EPDS**

The EPDS was developed by British psychiatrist John Cox [15] and others to screen for postnatal depression. The Japanese version of the EPDS was used to assess whether a person was depressed or anxious and to evaluate their ability to perform household and childrearing tasks, based on their mood over the past 7 days (3 points for “usually”, 2 points for “sometimes”, 1 point for “rarely”, and 0 points for “never”). The scale comprises four questions on childrearing anxiety, five questions on depression, and one question on sleep disturbance due to depression.

### **Analysis method**

The inverted items on the scale were processed in reverse order, and the analysis was performed using a nonparametric test. Regarding the reliability of the subscale of the marital parenting perception scale (surveyed three times), Cronbach’s alpha coefficients were 0.83-0.90 for “mutual emotional support” during pregnancy, 0.84-0.89 for “mutual concrete support”, 0.69-0.83 for “agreement and negotiation on childrearing”, 0.69-0.76 for “sharing of responsibilities and difficulties”, 0.86-0.88 for “mutual emotional support”, 0.81 for “mutual concrete support”, 0.74-0.76 for “agreement and negotiation on childrearing”, and 0.68 for “sharing of responsibilities and difficulties”. The reliability was judged to be high and appropriate.

We focused on the groups that continued the program (continuation group) and those that did not (non-continuation group) from immediately after the program started to 1 month after the program started. We examined the effects of the program based on the changes at the three timepoints: before, immediately after, and 1 month after the program. Furthermore, we evaluated the effects and characteristics of continuing the program and the changes in the scores for the pregnancy and childcare interventions.

The scale scores were analyzed using the sum of the scores as the score. For paired changes at three timepoints, Friedman’s two-way analysis of ranks (multiple comparisons Bonferroni) was used; for paired changes at two timepoints, Wilcoxon’s signed rank test was used; for comparisons between two unpaired groups, the Mann-Whitney U test was used; and for comparisons of proportions, the chi-square test was used. We comprehensively examined the results of the pregnancy and childcare periods. All statistical analyses were performed using Statistical Package for the Social Sciences (version 25.0).

### **Ethical considerations**

The request for participation in the survey clearly stated that participation was voluntary. Furthermore, it stated that there would be no disadvantage if the participant withdrew during the survey. In the questionnaire survey, a checkbox was provided to confirm participant consent. The survey was approved by the Research Ethics Committee of Nagoya University of Arts and Sciences (approval no. 621; approval date: October 28, 2022).

**Results**

The number of subjects of the analysis of the valid responses from the three consecutive surveys was 42 in the pregnancy period (21 wives, 29.2 ± 2.7 years old, 5 part-time or temporary workers, 16 full-time employees; 21 husbands, 30.3 ± 2.1 years old, all full-time employees), 32 in the middle of the pregnancy period, 10 in the late pregnancy period, and 278 in the childrearing period (128 wives, 32.3 ± 4.0 years old, 40 part-time or casual workers, 83 full-time employees, 2 self-employed, 2 full-time housewives, 1 student; 150 husbands, 33.8 ± 3.4 years old, 2 part-time or casual workers, 145 full-time workers, 3 self-employed). The number of children under 5 years old was 212, 63, and 3 in the first, second, and third surveys, respectively.

The group that continued the program during pregnancy comprised 12 participants (6 husbands and 6 wives), whereas the group that did not continue the program comprised 30 participants (15 husbands and 15 wives). The group that continued the program during childrearing comprised 79 participants (53 husbands and 26 wives), whereas the group that did not continue the program comprised 199 participants (97 husbands and 102 wives). Cases with dishonest responses were excluded from the survey.

**Comparison of the scores on the subscale of the couple parenting perception scale between the program continuation and program non-continuation groups**

**Pregnancy period**

Table 3 presents the subscale scores during the pregnancy period depending on whether the program was continued and the changes in the scores for each group caused by the program.

Table 3: Changes in scores on the lower scale during pregnancy, comparing the two groups based on whether or not they continued with the program, and the changes in scores for each group

Lower scale	Efforts	Program continuation group N = 12				Program non-continuation group N = 30				Comparison of two groups	
		MEAN	MEDIAN	SD	p (1)	MEAN	MEDIAN	SD	p (1)	p (2)	r
<b>Couple Parenting Awareness</b>											
Emotional support for each other	Before	3.67	3.88	0.92		3.51	3.50	1.01		.737	0.1
	Immediately after	3.38	3.63	1.16	.191	3.48	3.38	0.85	.130	.790	0.0
	One month later	3.77	4.00	0.79		3.05	2.75	1.06		.027 *	0.3
Concrete support for each other	Before	3.58	3.50	0.83		3.53	3.50	0.95		.877	0.0
	Immediately after	3.27	2.88	1.00	.139	3.55	3.50	0.85	.524	.269	0.2
	One month later	3.90	4.00	0.71		3.20	3.13	1.01		.023 *	0.4
Agreement and negotiation on child-rearing	Before	3.53	3.67	0.85		3.53	3.33	0.81		.455	0.1
	Immediately after	3.42	3.17	0.92	.663	3.37	3.17	0.92	.200	.854	0.0
	One month later	3.75	4.00	0.90		3.13	3.33	0.94		.048 *	0.3
Difficulty in sharing responsibility	Before	3.35	3.25	0.87		2.85	2.88	0.85		.120	0.2
	Immediately after	3.06	2.88	0.59	1.000	2.96	3.13	0.95	.305	.933	0.0
	One month later	3.08	3.13	1.07		3.23	3.25	0.84		.633	0.1
<b>Effect of father's participation in education</b>											
Effect on childr	Before	4.22	4.40	0.84	1.000	3.77	3.50	0.90	.079	.119	0.1
	One month later	4.21	4.20	0.65		3.52	3.15	0.86		.010 *	0.4
Effect on children's social skills	Before	3.83	4.10	0.91		3.69	3.50	0.91		.575	0.2
	One month later	3.73	3.80	0.77	.422	3.43	3.10	0.74	.072	.292	0.2
<b>Inhibition of bonding formation</b>											
General factors	Before	1.51	1.80	0.85	.858	1.89	2.25	0.98	.114	.103	0.3
	One month later	1.53	1.80	0.80		1.81	2.00	0.97		.395	0.1
Rejection and pathological anger	Before	1.64	1.67	1.15	1.000	1.82	2.17	1.19	1.000	.556	0.1
	One month later	1.64	1.67	1.15		1.82	2.17	1.19		.556	0.1
Anxiety about children	Before	1.33	1.00	1.17	1.000	1.80	2.00	1.30	1.000	.338	0.1
	One month later	1.33	1.00	1.17		1.80	2.00	1.30		.338	0.1
Early abuse	Before	0.75	0.00	1.36	1.000	1.33	1.50	1.25	1.000	.114	0.2
	One month later	0.75	0.00	1.36		1.33	1.50	1.25		.114	0.2

P(1): Friedman's test for ranked data, Wilcoxon signed-rank test, p < 0.05 ns  
P(2): Mann-Whitney U test (two-tailed) \*: p < 0.05 \*\*: p < 0.01  
r: Effect size using test statistic Z. Criteria: 0.1 small, 0.3 medium, 0.5 large

**Recognition of couple parenting**

No significant difference was observed between the two groups in terms of whether they continued the program after the initial assessment. After 1 month of the program, the group that continued with the program scored significantly higher than the group that did not in terms of “mutual emotional support”, “mutual practical support”, and “agreement and negotiation on childrearing”. No significant score changes were observed in either group because of the program. The effect size for continuing the program for “mutual emotional support”, “mutual concrete support”, and “agreement and negotiation on childrearing” was 0.3-0.4; therefore, we can assume that continuing the program had an effect.

**Effects of fathers’ participation in education**

The effect of fathers’ participation in education on their children was significantly higher in the continuation group than in the non-continuation group after 1 month of the program. The effect size on children was 0.4; therefore, we can assume that continuing the program had an effect.

**Inhibition of attachment to the child**

There were no significant differences in the scores of the two groups or in the changes in scores before and after the program for the four factors of general factors, rejection and pathological anger, anxiety about the child, and early abuse, which are attachment disorders in children.

**Childrearing period**

Table 4 presents the subscale scores for continuation of the program during pregnancy and score changes for each group’s program participation.

Table 4. Changes in scores on the subscale for each group during the child-rearing period and comparison of the two groups based on whether they continued the program.

Lower scale	Program continuation group N = 79	Program continuation group				Multiple comparisons	Program non-continuation group N = 199				Comparison of two group		
		Efforts	MEAN	MEDIAN	SD		p (1)	MEAN	MEDIAN	SD	p (1)	Multiple comparis	p (2)
<b>Couple Parenting Awareness</b>													
Emotional support for each other	Before	a	3.34	3.50	0.98	.168	3.02	3.00	0.91	.016*	b-c	.008 **	0.2
	Immediately after	b	3.46	3.50	1.01		3.10	3.00	0.93				
	One month later	c	3.60	3.75	0.83		2.85	3.00	1.01				
Concrete support for each other	Before	a	3.32	3.25	0.80	.209	2.94	3.00	0.85	.039*	ns	.002 **	0.2
	Immediately after	b	3.43	3.50	0.87		3.06	3.00	0.87				
	One month later	c	3.54	3.75	0.81		2.84	3.00	0.98				
Agreement and negotiation on child-rearing	Before	a	3.23	3.00	0.91	.543	2.98	3.00	0.79	.002**	b-c	.030 *	0.1
	Immediately after	b	3.39	3.33	0.89		3.10	3.00	0.84				
	One month later	c	3.43	3.33	0.85		2.91	3.00	0.88				
Difficulty in sharing responsibility	Before	a	2.68	2.75	0.80	.031*	2.82	2.75	0.72	.073	ns	.318	0.1
	Immediately after	b	2.87	3.00	0.90		2.86	3.00	0.73				
	One month later	c	2.74	2.75	0.88		3.05	3.00	0.81				
<b>Effect of father’s participation in education</b>													
Effect on children	Before		3.84	3.80	0.55	.982	3.52	3.50	0.65	.200		.000 **	0.1
	One month later		3.84	3.90	0.69		3.58	3.50	0.84				
Effect on children’s social skills	Before		3.73	3.80	0.77	.530	3.41	3.20	0.69	.847		.000 **	0.1
	One month later		3.67	3.60	0.70		3.40	3.20	0.80				
<b>Attachment disorder in children</b>													
	Before		0.95	0.80	0.61	.066	0.79	0.60	0.55	.000**		.049 *	0.1
	One month later		1.08	1.20	0.56		0.98	1.00	0.60				
<b>EPDS</b>													
Depression	Before		1.02	1.00	0.81	.619	0.79	0.80	0.71	.006**		.032 *	0.1
	One month later		1.03	1.00	0.83		0.93	1.00	0.71				
Child-rearing anxiety	Before		1.14	1.00	0.89	.613	0.93	1.00	0.78	.022*		.102	0.1
	One month later		1.13	1.25	0.81		1.05	1.25	0.75				
Depression-related sleep disorder	Before		1.01	1.00	0.98	.954	0.82	1.00	0.96	.007**		.099	0.1
	One month later		1.01	1.00	0.90		1.01	1.00	0.89				

P (1): Friedman’s test for ranked data (multiple comparisons, Bonferroni) , Wilcoxon signed-rank test \*: p < 0.05 \*\*: p < 0.01

P (2): Mann-Whitney U test (two-tailed) \*: p < 0.05 \*\*: p < 0.01

r: Effect size using test statistic Z. Criteria: 0.1 small, 0.3 medium, 0.5 large



### Recognition of couple parenting

For the subscales of the couple parenting recognition scale, “mutual emotional support”, “mutual concrete support”, and “agreement and negotiation on childrearing”, the continuation group scored significantly higher than the non-continuation group at all three timepoints.

The score changes in each group at the three timepoints were analyzed using the Friedman test (multiple comparison Bonferroni test). Although the continuation group did not show any significant score changes, the non-continuation group had the highest scores immediately after the program and the lowest scores 1 month after the program, with a significant decrease in scores for “mutual emotional support” and “agreement and negotiation on childrearing”.

From a comparison of the continuation and non-continuation groups, the effect size of continuing the program (immediately after the program: 1 month after the program) (shown by the inequality sign) was larger for “mutual emotional support” ( $0.2 < 0.4$ ), “mutual concrete support” ( $0.2 < 0.3$ ), and “agreement and negotiation on childrearing” ( $0.1 < 0.3$ ) (Table 4).

### Effects of fathers’ participation in education

The effects of fathers’ participation in education on their children and on their children’s social skills were significantly higher in the continuation group than in the non-continuation group before the program began, and 1 month after the program, the effects of fathers’ participation in education were significantly higher in the continuation group than in the non-continuous group. No significant change was observed in the perception of the effects of fathers’ participation in education in each group before and after the program.

Although the effect size ( $r = 0.2$ ) suggests that the effect of continuing the program is small, the fact that there was no change in the effect of the discussion on the effect of fathers’ participation in education in each group after 1 month suggests that there was an effect.

### Attachment disorders in children and the EPDS

The scores for the continuation group before the program were significantly higher than those for the non-continuation group after the program. After 1 month of the program, the non-continuation group exhibited a significant increase in scores; however, no significant difference in scores was observed between the continuation and non-continuation groups.

According to the EPDS, the scores for “depression”, “parental anxiety”, and “sleep disturbance due to depression” were significantly higher for the continuation group than for the non-continuation group before the program. Significant increases in the scores were observed in the non-continuation group after the program, particularly in “depression”, “parental anxiety”, and “sleep disorders due to depression”; however, no significant changes were observed in the continuation group 1 month after the program, and during this time, no significant difference was observed between the continuation and the non-continuation groups.

### Characteristics of the continuation and non-continuation groups

Of the 320 participants (42 pregnant women and 278 parents), 91 continued the program and 229 did not. The chi-square test was performed to examine the relationship between the presence or absence of “recognition of the meaning of couple parenting”, “recollection of the content of the program”, and “awareness of the program” 1 month after the program and whether the program continued. Table 5 presents the results.

Those who recognized the meaning of couple parenting (Yes), remembered the content of the program (Yes), and were aware of the program (Yes) were more likely to be in the continuation group and less likely to be in the non-continuation group. From the Phi

Table 5: Relationship between awareness of couple parenting and continuation of the program.

		Program continuation group		Program non-continuation group		$\chi^2$	p	$\phi$	p
		N = 91		N = 229					
		N	Residual	N	Residual				
Awareness of the meaning of couple parenting	Yes	53	7.8	35	-7.8	60.28	.000	0.4	.000 **
	No	38	-7.8	194	7.8				
Remember the content of the couple parenting initiative	Yes	56	10.3	18	-10.3	105.55	.000	0.6	.000 **
	No	35	-10.3	211	10.3				
Aware of couple parenting initiatives	Yes	56	10.0	20	-10.0	100.27	.000	0.6	.000 **
	No	35	-10.0	209	10.0				

Cross tabulation  $\chi^2$  test \*\*:  $p < 0.01$

coefficient of 0.6, we can assume that remembering the content of the couple parenting program and being aware of the program had a significant impact on program continuation. Furthermore, the scores for the four subscales of the Couple Parenting Awareness Scale were significantly higher in the continuation group than in the non-continuation group, and the scores for the perception of the effects of fathers' participation in education, "effects on the child", and "social effects on the child" were also significantly higher in the continuation group (Table 6).

### Effects of different intervention periods during pregnancy and childrearing

Table 6 presents the results of the comparison of the subscale scores for parental awareness during pregnancy and childrearing 1 month after the intervention.

Table 6: Couple Parenting Recognition Subscale scores 1 month after the initiative: Comparison between the pregnancy and childrearing periods.

	V Pregnancy						VI Childrearing period						Comparison			
	continuation group			II Program non-continuation group			III Program continuation group			IV Program non-continuation group			I	II	III	V
	N = 12			N = 30			N = 79			N = 199			S	S	S	S
	MEAN	MEDIAN	SD	MEAN	MEDIAN	SD	MEAN	MEDIAN	SD	MEAN	MEDIAN	SD	P	P	P	P
<b>Couple Parenting Awareness</b>																
Emotional support for each other	3.77	4.00	0.79	3.05	2.75	1.06	3.60	3.75	0.83	2.85	3.00	1.01	.356	.817	0.00**	.511
Concrete support for each other	3.90	4.00	0.71	3.20	3.13	1.01	3.54	3.75	0.81	2.84	3.00	0.98	.117	.137	0.00**	.047*
Agreement and negotiation on childrearing	3.75	4.00	0.90	3.13	3.33	0.94	3.43	3.33	0.85	2.91	3.00	0.88	.162	.279	0.00**	.129
Difficulty in sharing responsibility	3.08	3.13	1.07	3.23	3.25	0.84	2.74	2.75	0.88	3.05	3.00	0.81	.319	.102	0.04**	.054
<b>Effect of father's participation in education</b>																
Effect on children	4.21	4.20	0.65	3.52	3.15	0.86	3.84	3.90	0.69	3.58	3.50	0.84	.096	.558	.001**	.785
Effect on children's social skills	3.73	3.80	0.77	3.43	3.10	0.74	3.67	3.60	0.70	3.40	3.20	0.80	.706	.962	.001**	.947

Mann-Whitney  $\mathcal{O}U$  test (two-tailed) \*:  $p < 0.05$  \*\* $p < 0.01$ .

In the comparison between the continuation groups during the pregnancy and childrearing periods and the two non-continuation groups during the pregnancy and childrearing periods, no significant differences in the scores for the four subscales were observed. In the comparison between the pregnancy and childrearing periods (overall), the scores for "mutual specific support" were significantly higher in the pregnancy period.

Table 7 presents the correlation between the pregnancy and childrearing periods after 1 month of the program in the continuation and non-continuation groups.

"Mutual emotional support", "mutual concrete support", and "agreement and negotiation in childrearing" on the subscale of the couple parenting awareness scale during the pregnancy and childrearing periods were positively and significantly correlated.

Table 7: Correlation between subscale scores for recognition of couple parenting and other scales

Lower scale	Pregnancy				Child-rearing period			
	Emotional support for each other	Concrete support for each other	Agreement and negotiation on child-rearing	Difficulty in sharing responsibility	Emotional support for each other	Concrete support for each other	Agreement and negotiation on child-rearing	Difficulty in sharing responsibility
<b>Program continuation group</b>								
Couple Parenting Awareness	Concrete support for each other	.94**			.81**			
	Agreement and negotiation on child-rearing	.72**	.88**		.84**	.58**		
	Difficulty in sharing responsibility	-.11	-.28	-.53	-.014	-.27*	-.40**	
Effect of father's participation in education	Effect on children	.48	.36	.28	.40	.21	.15	-.02
	Effect on children's social skills	.56	.56	.60*	-.02	.35**	.31**	.15
Inhibition of bonding formation	General factors	-.78**	-.68*	-.48	.09			
	Rejection and pathological anger	-.66*	-.56	-.55	.20			
	Rejection and pathological anger	-.39	-.38	-.45	.35			
	Anxiety about children	-.48	-.41	-.49	.19			
EPDS	Negative emotions					-.07	-.05	.24*
	Depression					.05	.09	.25*
	Child-rearing anxiety					.09	.14	.28*
	Depression-related sleep disorder							.19
	Anxiety about children							-.27*
<b>Program non-continuation group</b>								
Couple Parenting Awareness	Concrete support for each other	.68**			.78**			
	Agreement and negotiation on child-rearing	.53**	.75**		.63**	.65**		
	Difficulty in sharing responsibility	.08	-.07	-.18	-.18**	-.19**	-.21**	
Effect of father's participation in education	Effect on children	.37*	.61**	.59**	.19	.35**	.28**	.21**
	Effect on children's social skills	.14	.48**	.52**	.04	.38**	.36**	.29**
Inhibition of bonding formation	General factors	-.23	-.43*	-.39*	-.09			
	Rejection and pathological anger	-.19	-.41*	-.40*	.13			
	Rejection and pathological anger	-.19	-.50**	-.50**	.08			
	Anxiety about children	-.27	-.50**	-.57**	.10			
EPDS	Negative emotions					-.12	-.13	-.03
	Depression					-.21**	-.15*	-.17*
	Child-rearing anxiety					-.19**	-.09	-.10
	Depression-related sleep disorder							.10
	Anxiety about children							-.14*

\*\* Correlation coefficient is significant at the 1% level (two-tailed)  
 \* Correlation coefficient is significant at the 5% level (two-tailed)  
 Blank cells indicate that there is no applicable data.

No significant correlation was observed between “sharing responsibilities and difficulties” and “mutual emotional support” during pregnancy; however, during the childrearing period, a weak but significant negative correlation (correlation coefficient -0.4 to -0.2) was observed between “mutual emotional support” and “sharing responsibilities and difficulties”. When “sharing responsibilities and difficulties” was high (low), “agreement and negotiation in childrearing” were low (high).

Regarding the relationship between attachment disorders in children and the EPDS (during the childrearing period only), the scores for attachment disorder in children were lower when the subscale scores for the Couple Parenting Awareness Scale (excluding “sharing

responsibility and difficulties”) were higher during pregnancy. However, the results showed that scores for attachment disorder in children and the EPDS were higher when “agreement and negotiation in childrearing” was higher in the continuation group during the childrearing period.

## **Discussion**

### **Evaluation of a program to promote couple parenting**

#### **Effects of continuing a couple parenting program**

The results revealed that scores increased after 1 month of continuous participation in the program and decreased significantly if the program was not continued. These findings verified that continued participation in the program improved scores, and it was recognized that continuing the program was important rather than just taking part in it once. In particular, the factors that seemed to lead to continued participation in the program were “remembering the content of the program” and “being aware of the program”, and it is believed that understanding the significance of the couple parenting program is an important element. Furthermore, the recognition of the effects of fathers’ participation in education provides an important perspective for husbands-to-be. It is believed that the intervention and approach methods, as well as the method of presenting the program, should be further examined from the perspective of “remembering the program content” and “being aware of the program’s approach” to promote continuation.

The fact that the score for “sharing responsibility and difficulties” was decreasing was believed to be a characteristic of the low group. The continuation group scored low on “sharing responsibility and difficulties” during the childrearing period, which had a negative impact on “agreement and negotiation in childrearing” and “mutual concrete support”. It is believed that the difficulty lies in changing the husband’s perception of his social role. For individuals to be equal, eliminating the division of roles based on sex and realizing a society defined by who the person is are necessary. However, Japan recorded its lowest ever score of 125<sup>th</sup> of 146 countries in the 2023 Gender Gap Index [16] and was ranked lowest among developed countries. The aim is to create a society in which countries, companies, and individuals can review their attitudes and actions and feel a sense of happiness; however, efforts to achieve gender equality must be a national issue. Gender roles refer to the roles (attitudes, attributes, behaviors, etc.) that are expected of individuals based on their gender and the roles that are considered socially and culturally appropriate or desirable. For example, stereotypes of gender-based roles such as “men work outside the home and women do housework and childrearing” can be cited. Education is an effective means of eliminating the disparities caused by gender roles. In fact, gender stereotypes are often depicted in textbooks and other educational materials, and children tend to be unconsciously influenced by these ideas from a young age. When you see or hear about gender discrimination based on gender roles, having a perspective that puts yourself in the other person’s shoes and speaking up when you experience it, rather than just letting it slide, are important. Creating opportunities for individuals to choose roles based on their own desires and abilities, rather than on their gender, will lead to the elimination of gender inequality. We believe that continual discussions between husband and wife are an approach that cannot be avoided.

#### **Differences in the effects of the program depending on the timing of implementation**

The program was implemented during the pregnancy and childbearing periods. Although a difference in the number of individuals in the target groups was observed, the results after the program revealed that the effects of fathers’ awareness of the benefits of participating in education were higher during the pregnancy period than during the childbearing period and that there was an effect of making the information on the benefits of fathers’ participation in education known and having the couple share it. Furthermore, “mutual concrete support” was higher than during the childrearing period, and there was a strong relationship between “mutual emotional support” and “agreement and negotiation on childrearing”; therefore, we believe that the situation is good.

Because the results revealed a significant increase due to the effects of the program and the continuation of further efforts during the childrearing period and a significant decrease when these efforts were not continued, we believe that cooperation in childrearing is more

effective when it is targeted at the actual childrearing period. However, because we did not verify the effects of continuing the program after childbirth for the group that was asked to participate from the pregnancy period, we would like to discuss this topic in the future.

### **Effects of the program on attachment to the child and the EPDS**

During pregnancy, a significant relationship was observed between attachment disorders and the level of “emotional support for each other”, “concrete support for each other”, and “agreement and negotiation on childrearing”. Okayama [17] reported that the marital relationship affects bonding with the fetus through the mother’s perception of pregnancy. Furthermore, couples with high levels of marital satisfaction, as observed by the mother, are believed to have high levels of support during pregnancy [18]. From this, the subscale scores of the couple parenting perception scale, “emotional support for each other”, “concrete support for each other”, and “agreement and negotiation on childrearing”, were high and had a positive impact on attachment to the child.

During the childrearing period, negative feelings toward the child are believed to be associated with EPDS scores. If the mother is depressed, the results of the child attachment (bonding) test (scores) will be poor. Despite the high effectiveness of fathers’ participation in education, the unexpected result was that when “parenting agreement and negotiation” was high, bonding and EPDS (high) worsened. Unexpectedly, “parenting agreement and negotiation” was negatively correlated with “sharing responsibility and difficulties”, and “sharing responsibility and difficulties” was low because “parenting agreement and negotiation” was high. The fact that “responsibility sharing and difficulties” were low means that “the husband and wife have different values”, “the husband has little time to spend with his wife”, “the husband has a strong sense that men should work and women should stay at home”, and “the wife feels that she wants the couple to discuss things and share things, but the husband doesn’t have that mindset” and the fact that “they were unable to cope when they had a lot to do and it was difficult” suggest that “agreement and negotiation about childrearing” was not reflected, and it is believed that the feelings of anxiety and frustration about childrearing increased and that “sharing responsibility and difficulties” had an effect.

### **Impact of discussions on fathers’ participation in education**

Sharing the effects of fathers’ participation in education during the program, establishing basic lifestyle habits and family environments as parents, and reflecting on and discussing with one’s spouse the sharing of responsibilities and roles provided knowledge of the effects of fathers’ participation in education on childrearing, and it became a starting point for communication between the couple as they worked toward a common goal in childrearing. The effects on the child and the child’s social skills were positively correlated with each other, and there was a synergistic effect.

The significant difference between the two groups in terms of whether the “effects on children” and “effects on children’s social skills” programs were continued was because the fathers’ understanding of the importance of the program and their feelings about it differed. We believe that the high evaluation scores of the effects of fathers’ participation in education, together with the discussions, increased couple parenting and had a positive effect. According to Morishita [19], the changes that come with becoming a father include a sense of love for the family, a sense of responsibility and calmness, a broadening of one’s perspective through children, a view of the past and the future, and a loss of freedom. It has been shown that an interest in childrearing is promoted by having an egalitarian view of gender roles, being satisfied with one’s marital relationship, and having a positive perception of one’s relationship with one’s children. It was believed that the more fathers recognized the educational benefits of fatherhood, the more they accepted their parental role, the more egalitarian their views of gender roles, and the more satisfied they were with their marital relationship [20].

### **Future Issues**

In the previous survey, a positive correlation was observed between the subscales of the couple parenting awareness scale. This time, a negative correlation was observed, and the low level of “sharing responsibility and difficulties” cannot be ignored because it had an

impact on attachment disorders in children and the EPDS. We would like to incorporate the results of this study in the program's efforts to improve the situation.

### **Conclusion**

The group that continued the reinforcement program for 1 month exhibited many positive effects during the childrearing period; therefore, the program was more beneficial during the childrearing period than during pregnancy. In particular, devising ways to ensure that the program is not forgotten and to spread awareness of it is important because the program was continued when the participants were aware of the meaning of couple parenting, remembered the program content, and were conscious of the program.

### **Limitations of the Study**

This study was conducted as a web-based survey, and because the screening survey did not allow the purpose of the survey to be disclosed, there were few participants who were in the "pregnancy period", which resulted in a decrease in the number of surveys. Furthermore, some dishonest responses were made, and in such cases, the responses were excluded from the analysis. There is a limit to the interventions conducted on the web in that we can only trust the respondents and cannot confirm the exact implementation status. We hope that in the future, we will be able to obtain reliable responses from research companies with an accurate cooperation.

There is a need to examine the approach to the program and the method of intervention and to use this for the support and promotion of couple parenting and to clarify the characteristics of the interaction between husband and wife and the approach to the couple parenting program by the husband and wife through the reanalysis of the data by the husband and wife.

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### **Conflict of Interest**

There are no conflicts of interest to declare in the promotion of this research.

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