

Evaluating effectiveness of pre-parental education for university students using Kirkpatrick model

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Abstract: Pre-parental education is designed to equip prospective parents with essential parenting skills. Korea recently introduced it alongside population education as part of a broader strategy to address declining birth rates. However, there remains a scarcity of comprehensive studies evaluating its effectiveness in influencing childbirth-related attitudes. The Kirkpatrick training evaluation model, which assesses training effectiveness across four stages—reaction, learning, behavior, and results—has been widely applied in educational assessments. This study aims to evaluate how university students' reactions (Level 1) and learning outcomes (Level 2) from pre-parental education impact their expected number of children (a behavioral outcome, Level 3) using the Kirkpatrick model. A 10-week pre-parental education program, Healthy Parenting Recipe, was implemented for university students at K University in D City, South Korea, during the second semester of 2024. A total of 67 students participated in the study, and evaluations were conducted up to Level 3. Data were analyzed using SPSS/PC Windows 29.0, employing descriptive statistics and ordinal logistic regression. Greater satisfaction with course content (Level 1: Reaction) was associated with higher expected number of children ($B = .234$, $CI: .063-.405$, $p = .007$). Increased parenting knowledge (Level 2: Learning) also correlated with a higher expected number of children ($B = 2.818$, $CI: .130-5.505$, $p = .04$). Additionally, students prioritizing maternal career continuity expected more children ($B = .771$, $CI: .188-1.353$, $p = .01$), whereas those prioritizing meeting infant needs expected fewer ($B = -.556$, $CI: -1.110- .003$, $p = .049$). These findings indicate that the results from Levels 1 and 2 significantly influence behavioral outcomes (Level 3). This study validates the interconnections among evaluation levels proposed by the Kirkpatrick model. Furthermore, it confirms the model's effectiveness as a comprehensive evaluation framework for pre-parental education among university students.

Keywords: Education, Low fertility, Offspring, Parenting, University.

1. Introduction

1.1. Rationale of the Study

Pre-parental education equips prospective parents with the knowledge and skills necessary to nurture their children by fostering an understanding of child [1]. It also fosters confidence in parenting roles and enhances problem-solving abilities to address challenges during the parenting journey [2]. In response to declining birth rates, the Korean government has recently established guidelines and systems to promote pre-parental education [3]. Empirical evidence suggests that such educational programs foster pro-marriage and pro-childbirth values [4]. Moreover, some local government-led programs have also shown an increase in the expected number of children among participants [5].

The target audience for pre-parental education is diverse, including middle and high school students, college students, and engaged couples. Among them, college students are considered a key demographic due to their interest in future family life, childbirth, parenting, and openness to forming

romantic relationships [6]. Programs designed for this group cover a wide range of topics, such as the meaning of parenthood, marriage and childbirth, parent-child interactions, early childhood development, and health management [6]. Program durations range from three to 15 weeks [6] and are, delivered during regular class hours [3] or as extracurricular activities [7]. Reported positive outcomes, include enhanced psychological well-being [8] stronger family values [9] and increased parenting confidence [10].

However, Moon, et al. [6] suggested that the effectiveness of pre-parental education should ideally be validated through participants' parenting practices when they become parents. Seo and Lee [11] emphasized that such programs should also aim to shape participants' attitudes toward social parenting roles. Nevertheless, verifying these effects requires substantial time and presents logistical challenges of tracking participants over extended periods. Therefore, evaluating the impact of pre-parental education on knowledge, skills, attitudes, and behavior change necessitates a robust evaluation model.

Kirkpatrick's evaluation model [12] is widely recognized for assessing not only knowledge and skill acquisition but also behavioral and organizational changes. It comprises four levels: reaction, learning, behavior, and results. The reaction level assesses participants' satisfaction with program contents, methods, and overall utility, which influences subsequent learning [13]. The learning level evaluates the acquisition of intended knowledge, skills, attitudes, confidence, and commitment. The behavior level, considered the core of the model, examines the application of acquired skills and attitudes in real-life situations. Lastly, the results level assesses the ultimate outcomes of the program, such as its impact on national birth rates in addressing low fertility.

While result-level evaluation is significant, it is often challenging to establish causality and assess cost-effectiveness. Consequently, most studies focus on behavior-level outcomes, such as participants' expected number of children—a measure closely linked to actual childbirth behavior [14]. Moreover, Kirkpatrick's model assumes a hierarchical relationship among the levels, where reactions influence learning, which in turn impacts behavior and results [12].

Given this framework, Kirkpatrick's evaluation model offers a comprehensive approach to assessing how pre-parental education influences college students' behavioral changes related to childbirth and parenting. However, the model is not without limitations, which include difficulties in establishing causal relationships between variables at different levels [14]. Furthermore, Choi [15] found no significant correlations between learning and behavior levels. These findings highlight the need for further investigation into the validity of Kirkpatrick's model as an evaluation framework for pre-parental education, as well as a deeper exploration of Interrelationships among its levels.

Previous studies have primarily measured pre-parental education outcomes using parenthood and parenting-related knowledge and attitudes through pre-post tests or comparative groups [6]. Although some studies have evaluated online parental education for existing parents [16] no prior work has applied Kirkpatrick's model to pre-parental education. This study aims to evaluate the effectiveness of pre-parental education for college students using Kirkpatrick's three-level evaluation model. The findings are expected to validate the model's utility and shed light on relationships among its levels in the context of pre-parental education.

1.2. Purpose of the Study

This study applies Kirkpatrick's evaluation model to examine factors influencing college students' expected number of children through pre-parental education. The objectives are as follows:

To conduct reaction, learning, and behavior evaluations of pre-parental education for college students.

To examine the relationship between reaction and learning evaluations and behavior evaluation (expected number of children) to confirm interrelationships among evaluation levels.

2. Methods

2.1. Study Design

This study employed a descriptive survey design to evaluate the effectiveness of pre-parental education for university students using Kirkpatrick's Training Evaluation Model.

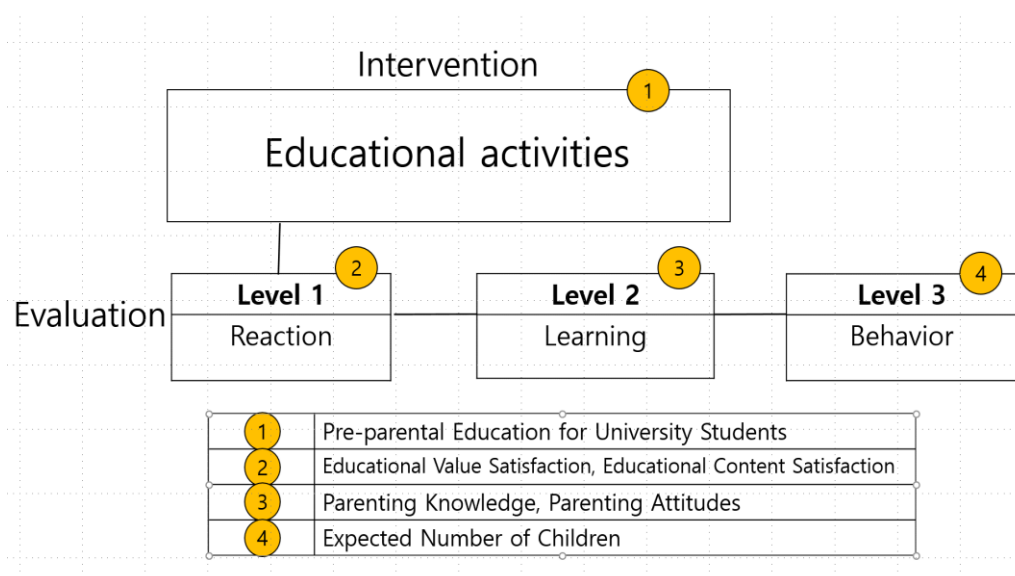


Figure 1.
Conceptual Framework for this Study.

2.2. Data Collection

This study was conducted with university students enrolled in the “Healthy Parenting Recipe” course offered at K University in Daegu, South Korea, in 2024. Developed by the city of Daegu in 2024, the course serves as a pre-parental education program for university students [17]. Participants completed surveys on the perceived value and satisfaction with the course content via a Google Forms link during the fourth week of the course. Following the conclusion of the parenting-related curriculum in the tenth week, students were surveyed to assess their parenting knowledge and attitudes. Three weeks later, during the thirteenth week, participants responded to a questionnaire on their expected number of children.

Of the 99 students initially enrolled in the course, 3 withdrew, and 19 declined to participate. Among the 78 students who participated in the first phase of the evaluation, 67 completed all three phases. No incomplete or insincere responses were identified in the data from these 67 students, and all were included in the statistical analysis.

2.3. Pre-Parental Education for University Students

The Healthy Parenting Recipe is a general education course developed in 2024 as part of D City’s initiative to address South Korea’s low birthrate. Designed for university students (as prospective parents), the program aims to provide essential parenting knowledge and skills while boosting their confidence in assuming parental roles [10]. The curriculum is structured into four modules: Understanding Myself and My Family, Healthy Pregnancy and Childbirth, Understanding Infants and Young Children, and Health Management for Infants and Young Children.

For this study, the course was delivered online through a learning management system (LMS) over 10 weeks, with weekly sessions lasting 25–35 minutes. A detailed breakdown of weekly course topics is presented in Table 1.

Table 1.
Structure of The Healthy Parenting Recipe.

Wks	Session	Category	Topic
1	1	Me and My Family	• Addressing Low Birth Rates: Work-Life Balance
	2		• Promoting Healthy Families
2	1		• Building Strong Marital Relationships and Parenthood
	2		• Parenting Attitudes and Attachment
3	1	Healthy Pregnancy and Childbirth	• Reproductive Health Management for Infertility Prevention
	2		• Preparing for a Healthy Pregnancy
4	1		• Childbirth Preparation and Delivery
5	2		• Various Childbirth Methods and Pain Management
	1		• Postpartum Care
6	2		• Towards Successful Breastfeeding
	1		• Understanding Postpartum Depression
	2		• Coping with Depression
7	1	Understanding Infants and Toddlers	• Growth and Development of Infants and Toddlers
	2		• Enhancing Parent-Child Interactions
8	1		• Understanding Baby Sleep
	2		• Reading Newborn Signals (Soothing a Crying Baby)
9	1	Infant and Toddler Health Care	• Development and Health of Infants and Toddlers
	2		• Caring for Newborns
	3		• Newborn Bathing and Umbilical Cord Care
	(Special lecture)		• Managing Newborn Body Temperature
10	1		• Preventing Accidents and Injuries in Infants and Toddlers
	2		

Instructional Design

: Title, Learning Objectives, Learning Content, Teaching and Learning Strategies, Lesson Summary

2.4. Instruments

2.4.1. Kirkpatrick Level 1: Reaction

Reaction was assessed through satisfaction with educational values and satisfaction with educational content. Satisfaction with educational value was assessed using a modified version of the education satisfaction measurement tool developed by Lee, et al. [18]. The tool consists of five items rated on an 8-point Likert scale, ranging from “very dissatisfied” (1) to “very satisfied” (8). The total score ranges from 5 to 40, with higher scores indicating greater satisfaction with educational value. In this study, the tool's reliability was Cronbach's $\alpha = .92$.

Satisfaction with educational content was measured using a tool assessing satisfaction with the 21-session course on child-rearing. The tool includes 21 items covering topics such as work-life balance, healthy family dynamics, parent-child relationships, parenting attitudes, and attachment. Each item was rated on a 5-point Likert scale ranging from “very dissatisfied” (1) to “very satisfied” (5). The total score ranges from 21 to 105, with higher scores indicating greater satisfaction with the educational content. The reliability of this tool in this study was Cronbach's $\alpha = .98$.

2.4.2. Kirkpatrick Level 2: Learning

The learning was measured through parenting knowledge and parenting attitudes.

Parenting knowledge

Parenting knowledge was assessed based on participants' final course grades. Participants were categorized into three levels: A, B, and C, with C being the lowest and A being the highest. Grade A was assigned a score of 3, while grade C was scored as 1.

2.4.3. Parenting Attitudes

Parenting attitudes were measured using a modified version of the tool developed by Kim [19] and adapted. The 13-item tool comprises four subdomains: degree of engagement with the baby, prioritization of child needs, recognition of the importance of care, and prioritization of maternal career. Each item was rated on a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5), with total scores ranging from 13 to 65. Higher scores indicate more positive parenting attitudes. The tool's reliability for the present study was Cronbach's $\alpha = .74$ compared to .62 in Lee and Lee's (2024) study. The Cronbach's α values for the subdomains were as follows: degree of engagement with the baby = .86, prioritization of child needs = .56, recognition of the importance of care = .69, and prioritization of maternal career = .75.

2.4.4. Kirkpatrick Level 3: Behavior

Behavior was assessed through participants' expected number of children, which was measured through the question, "How many children do you want to have?" Response options included: "I do not wish to have children," "1 child," and "2 or more children."

2.4.5. Ethics Statement

Participants were informed about the study's purpose, significance, and potential impacts of their involvement. They were assured of personal data protection and that withdrawal from the study at any point in time would have no negative consequences. Consent was obtained before proceeding with data collection. Participants who consented were asked to select "Agree" on the first screen of the Google Forms survey before proceeding to the questionnaire. The collected data was used solely for research purposes and stored securely in a password-protected Google Drive for one year after the study's completion, at which point it was safely discarded in compliance with relevant regulations.

2.5. Data Analysis

Data was analyzed using the IBM SPSS Statistics for Windows version 29.0 program. Descriptive statistics were used to examine participants' general characteristics, educational value satisfaction, content satisfaction, parenting knowledge, parenting attitudes, and expected number of children. Ordinal logistic regression analysis examined the factors influencing the expected number of children.

3. Results

3.1. General Characteristics

The sample comprised 23 males (34.3%) and 44 females (65.7%). By academic year, 34 participants (50.7%) were in their 1st or 2nd year, and 33 participants (49.3%) were in their 3rd or 4th year.

3.2. Measured Variables

The mean scores of the measured variables are as follows: For Level 1 (Reaction), the satisfaction with educational value was 83.93 ± 5.36 , and the educational content was 103.31 ± 5.47 . For Level 2 (Learning), 22 participants (32.8%) scored an A, 30 participants (44.8%) scored a B, and 15 participants (22.4%) scored a C in terms of parenting knowledge. The average score for parenting attitude was 48.74 ± 5.11 , with the following mean scores for the subdomains: degree of engagement with the baby 8.24 ± 1.27 , prioritization of baby's needs 10.84 ± 2.02 , recognition of the importance of care 21.50 ± 2.30 , and prioritization of maternal career 9.31 ± 2.32 . For Level 3 (Behavior), regarding the expected number of children, 39 participants (58.1%) expected two or more children, 18 participants (26.9%) expected one, and 10 participants (14.9%) expected none (Table 2).

Table 2.
Measured Variables.

(N=67)					
Kirkpatrick evaluation level	Variables	M±SD	Min.	Max.	Range
Reaction	Educational value satisfaction	83.93±5.36	20	40	5-40
	Educational content satisfaction	103.31±5.47	77	105	21-105
Learning	Parenting knowledge	n(%) A:22(32.8%), B:30(44.8%), C:15(22.4%)			
	Parenting attitudes	48.74±5.11	34	62	13-65
	Degree of engagement with the baby	8.24±1.27	4	10	2-10
	Prioritization of the baby's needs	10.84±2.02	6	15	3-15
	Recognition of the importance of care	21.50±2.30	16	25	5-25
	Prioritization of maternal career	9.31±2.32	3	15	3-15
Behavior	Expected number of children	n(%)			
		none:10(14.9%), 1:18(26.9%), 2 or more:39(58.2%)			

3.3. Factors Affecting Expected Number of Children

The parameter estimate for satisfaction with educational content was 0.234 ($p = 0.007$), indicating that satisfaction with the educational content influenced the expected number of children. In other words, as satisfaction increased, the expected number of children also tended to increase ($B = 0.234$, CI: 0.063–0.405, $p = 0.007$).

Table 3.
Factors affecting expected number of children.
(N=67)

Categories			B	SE	Wald	df	PAR p	95% CI	
								Lower	Higher
Behavior	Expected number of children	1	14.390	11.514	1.562	1	0.211	-8.178	36.957
		≥2	17.880	11.660	2.351	1	0.125	-4.973	40.733
General characteristics	Gender	Male	1.755	1.261	1.936	1	0.164	-0.717	4.226
		Female	0 ^a	.	.	0	.	.	.
	Academic Year	1-2	0.603	1.013	0.354	1	0.552	-1.383	2.589
		3-4	0 ^a	.	.	0	.	.	.
Reaction	Educational value satisfaction		-0.192	0.221	0.752	1	0.386	-0.625	0.241
	Educational content satisfaction		0.234	0.087	7.197	1	0.007	0.063	0.405
Learning	Parenting knowledge	A	2.818	1.371	4.223	1	0.040	0.130	5.505
		B	1.648	1.253	1.730	1	0.188	-0.808	4.104
		C	0 ^{a0}	.	.	0	.	.	.
	Parenting attitudes	Degree of engagement with the baby	0.487	0.372	1.707	1	0.191	-0.243	1.217
		Prioritization of the baby's needs	-0.556	.282	3.883	1	0.049	-1.110	-0.003
		Recognition of the importance of care	-0.295	.212	1.937	1	0.164	-0.710	0.120
		Prioritization of maternal career	0.771	0.297	6.724	1	0.010	0.188	1.353

Note: MFI $\chi^2=29.173$ ($p=.001$), Cox and Snell: .501, Nagelkerke: .598

Link function: Logit.

^a. The current parameter is duplicated and, therefore, set to 0.

Additionally, participants with an A grade in parenting knowledge were found to have a higher expected number of children ($B = 2.818$, $CI: 0.130-5.505$, $p = 0.04$). Regarding parenting attitude, prioritizing the baby's needs was associated with a lower expected number of children ($B = -0.556$, $CI: -1.110- -0.003$, $p = 0.049$), while prioritizing maternal career was associated with a higher expected number of children ($B = 0.771$, $CI: 0.188-1.353$, $p = 0.01$). In conclusion, the findings confirm the interrelationships between post-education reaction, learning, and behavior evaluations as proposed in Kirkpatrick's model of training evaluation [12] (Table 3).

4. Discussion

This study applied Kirkpatrick's training evaluation model to assess the effectiveness of a pre-parenting education program for university students. The goal was to investigate whether Level 1 and Level 2 outcomes influence the Level 3 behavioral outcomes, thereby contributing to the ongoing debate on the interrelationships between evaluation stages in the Kirkpatrick model.

The findings revealed that both Level 1 (reaction) and Level 2 (learning) influenced (Level 3) behavioral outcomes. Specifically, higher satisfaction with educational content at Level 1 was associated with a greater expectation of having more children at Level 3. This aligns with Kirkpatrick and Kirkpatrick [12] assertion that satisfaction with the content precedes learning outcomes for effective training. Additionally, the structural fit of the Kirkpatrick training evaluation model was supported by findings from previous studies, such as Kim and Park [20] which demonstrated that reaction evaluations positively influence behavioral outcomes. However, this contrasts with Lee, et al. [18] who found no significant effect of reaction evaluations on behavioral outcomes in their study of local government privacy training.

Reaction evaluation reflects learners' perceptions of and satisfaction with the training, with satisfaction with the content being a key factor [13]. When participants are satisfied with the content, the likelihood of engaging with the learning process increases, leading to the expected learning outcomes [12]. Thus, to enhance the learning effectiveness of an educational program, it is essential to prioritize not only satisfaction with the teaching methods, time, and facilities but also the content itself.

In Level 2 (learning), higher parenting knowledge and a greater emphasis on maternal career in parenting attitudes were associated with a higher expected number of children. Conversely, prioritizing baby needs was linked to a lower expected number of children. This confirms that learning evaluations influence behavioral outcomes. Learning refers to changes in knowledge, skills, and attitudes acquired through training, and its evaluation is a necessary precursor to behavioral change [12] an assertion supported by this study's results.

The finding that higher parenting knowledge after pre-parenting education was associated with a greater expected number of children aligns with previous studies [5] which found a similar correlation. Possessing more parenting knowledge may enhance university students' sense of parenting efficacy, leading to clear plans for having and raising children [21] and a higher expectation of the number of children. Furthermore, prioritizing maternal career over baby needs was associated with a higher expected number of children. Since the early 2000s, South Korea has experienced a sharp decline in birth rates; however, recent trends show an increase in positive attitudes toward marriage and childbirth among men and women of childbearing age [22] contributing to a gradual recovery. Nevertheless, unmarried individuals in their 20s and 30s tend to prioritize career planning and make decisions about the number of children based on the assumption of a balanced work-life environment [23]. Studies have shown that achieving a work-family balance through measures such as national financial support, maternity and paternity leave, and expansion of childcare services is essential for improving both economic activity and birth rates [22]. Furthermore, spousal support plays an important role in couples' decision to plan children. Therefore, while prioritizing maternal careers positively influences the expected number of children (as seen in this study), it must be accompanied by policies that promote

work-family balance and expand quality job opportunities for women to ensure that these attitudes translate into actual family planning decisions.

This study confirms that educational satisfaction, parenting knowledge, and parenting attitudes measured after pre-parenting education influence the expected number of children. Moreover, applying the Kirkpatrick model demonstrated interrelationships between evaluation stages (reaction, learning, and behavior). However, the study has limitations in not conducting a behavioral evaluation three months after the program or performing a Level 4 results evaluation.

5. Conclusion

This study implemented a pre-parenting education program for university students and applied the Kirkpatrick model to assess its effectiveness. The results showed that Level 1 (reaction) and Level 2 (learning) evaluations influenced Level 3 (behavioral) evaluations. The findings provide evidence of the Kirkpatrick model as a valuable framework for evaluating the effectiveness of pre-parenting education.

Future research should include follow-up studies with behavioral evaluation measured three months post-training, as well as studies defining the national birth rate as a Level 4 outcome variable to further assess the effectiveness of pre-parenting education.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Author Contributions:

Lee SH; Supervision, Conceptual Framework Design, Research Methodology, Data Collection, Statistical Processing and Analysis, Drafting Original Manuscript
Lee SA: Data Collection, Data Visualization, Manuscript Review, Revision and Editing.

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